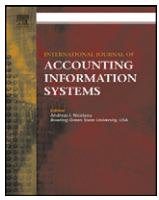
International Journal of Accounting Information Systems 13 (2012) 199–220

Contents lists available at SciVerse ScienceDirect

International Journal of Accounting Information Systems



On IT governance structures and their effectiveness in collaborative organizational structures

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ARTICLE INFO

Article history:
Received 10 May 2011
Accepted 1 June 2012

Keywords:
Collaborative organizational structures
IT governance
Dynamic capabilities
Co-created resources
Web 2.0 tools
Sustainable IT-related capabilities

ABSTRACT

Organizations today engage in various forms of alliances to manage their existing business processes or to diversify into new processes to sustain their competitive positions. Many of today's alliances use the IT resources as their backbone. The results of these alliances are collaborative organizational structures with little or no ownership stakes between the parties. The emergence of Web 2.0 tools is having a profound effect on the nature and form of these alliance structures. These alliances heavily depend on and make radical use of the IT resources in a collaborative environment. This situation requires a deeper understanding of the governance of these IT resources to ensure the sustainability of the collaborative organizational structures. This study first suggests the types of IT governance structures required for collaborative organizational structures. Semi-structured interviews with senior executives who operate in such alliances reveal that co-created IT governance structures are necessary. Such structures include co-created IT steering committees, co-created operational committees, and inter-organizational performance management and communication systems. The findings paved the way for the development of a model for understanding approaches to governing IT and evaluating the effectiveness for such governance mechanisms in today's IT-dependent alliances. This study presents a sustainable IT-related capabilities approach to assessing the effectiveness of suggested IT governance structures for collaborative alliances. The findings indicate a favorable association between organizations' IT governance efforts and their ability to sustain their capabilities to leverage their IT resources. These IT-related capabilities also relate to measures business value at the process and firm level.

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1467-0895/$ – see front matter
doi:10.1016/j.accinf.2012.06.005

This makes it possible to infer that collaborative organizations' IT governance efforts contribute to business value.

1. Introduction

Organizations engage in various strategic alliances to develop new business models for competitive advantage (Mayer and Teece, 2008). Conventional strategies include hierarchical relations, joint venture equity investments, cooperatives, cartels, and franchising. Today, organizations have information technology (IT), a dynamic tool, to expand their strategic alliances. This dynamic tool is making organizations rethink their strategies for effective use of their bundle of resources (Barney, 1991). As a result, new forms of corporate structures are now emerging. This situation means doing business today is about bringing disparate collaborative resources together. The result is emergence of new forms of corporate alliances, and extended alliances with geographically dispersed parties. These new forms of alliances are termed collaborative organizational structures (COS), or collaborative alliance, which are alliances developed with IT resources as their backbone. For example, organizations venturing into e-commerce initiatives will form alliances with courier companies for logistics, and finance-related organizations for payment facilitation.

The relentless march of computing power and internet connection speeds are bringing profound changes to the business environment. These resources are a major catalyst for the new trends of strategic alliances. A new group of technology, the Web 2.0 tools, has emerged. Web 2.0 tools are a new generation of Internet-based collaborative tools that allow users to interact and collaborate with each other in a social environment (Kane and Fichman, 2009). The Web 2.0 communities are consumers and creators of user-generated content in a virtual community. Initially consumed by individuals, the Web 2.0 technologies today are transforming conventional enterprises into enterprise 2.0 (McAfee, 2009). For example, British Telecom has introduced a huge Wikipedia-style database called BTpedia, a central blogging tool, a podcasting tool, project collaboration software and enterprise social networking. That is, IT-driven communication and collaboration are the backbone of the alliances in this environment. Demand-driven supply chain networks, collaborating on corporate data on social networks, digital supply chains, virtual teams, mass customization, vendor-managed inventories, and vendor-managed assembly lines are prevalent forms of business organizations and activities in the IT-intensive alliances of today. Corporate structures are transforming into virtual expanded organizations, which leverage the IT resources to reduce operational costs. The result is complex digital alliances with increased dependence on shared IT resources.

These new forms of business structures present new risks and challenges (Kane and Fichman, 2009; Turban and Volonino, 2011). Organizations make radical use of the IT resources within these business models. The dependency on IT also increases in these new forms of business collaborations. This dependency means new forms of IT governance requirements and guidelines to manage these risks and challenges. The new organizational structures will have new forms of IT resource integration, requiring new methods of governance to ensure information flows satisfy the established control objectives. That is, executives of the alliance partners will organize themselves differently to leverage the IT resources in the new business environment. While there is much conferred about the new forms of IT-enabled business structures, the governance mechanisms of their IT backbone have not received any resolute attention. It is reasonable to assume that the success and growth of these new forms of collaboration will be contingent upon appropriate IT governance structures and processes, just as it has within organizations (Weill and Ross, 2004). Of course, extant literature suggests various IT governance structures to manage the IT resources in organizations (for example, Sambamurthy and Zmud, 1999; Weill and Ross, 2004; Bowen et al., 2007; Prasad et al., 2010). These IT governance structures, however, are pertinent for the use of IT within organizations. The radical use of IT in COS requires a rethink on the viable forms of IT governance structures suitable for shared IT resources.

Accordingly, we address the following two key questions in this research. What are the effective IT governance structures for COS? How do we evaluate the effectiveness of these IT governance structures? An initial interpretive research design, using semi-structured interviews with contacts from collaborative alliances, revealed four forms of IT governance structures for the collaborative alliances. These structures include co-created lateral IT steering committees, co-created operational committees, and inter-organizational performance management and communication systems. Extant literature suggests

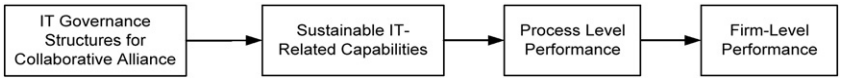

Fig. 1. Conceptual model.

that the IT-related capabilities obtain performance-differentiating value from the IT resources (Mata et al., 1995; Wade and Hulland, 2004). IT-related capabilities are organizations' unique knowhow of their IT resources. Because IT resources are dynamic, organizations' abilities to leverage their IT resources uniquely are contingent upon their ability to sustain their IT-related capabilities. Sustainable IT-related capabilities will ensure better application of IT resources to the business processes, which will eventually contribute to organizations overall firm-level performance. Based on the findings of the initial interpretive investigation and the above discussion, we suggest the following conceptual model of effective IT governance for COS (Fig. 1).

Field survey data from 118 senior IT and business managers showed that the suggested IT governance structures for COS lead to sustainable IT-related capabilities. These sustainable IT-related capabilities improve the internal processes of the collaborative alliances. The improved internal processes help organizations manage their external processes. The internal-external process coordination then contributes to firm-level business value. Overall, the model implies that the suggested effective IT governance structures for COS will lead to better business value for the COS partners. This paper progresses as follows. The next section presents an overview of IT governance. This follows discussion of the theoretical framework of this study. This follows the interpretive design to understand the IT governance for COS, and its outcome. We then develop a model for effective IT governance for COS. This follows discussion of the research design. We then present the results of this study. The final sections discuss the results, contributions, and implications of this study to theory and practice.

2. An overview of IT governance and strategic alliances

IT governance, focusing on information and IT assets, specifies the decision rights and accountability framework to encourage desirable behavior in the use of IT (Weill and Ross, 2004). This behavior relates to the form of the leadership, and organizational structures and processes that ensure that the organization's IT sustains and extends the organization's strategies and objectives (IT Governance Institute, 2007). IT governance essentially places structure around how organizations IT strategy aligns with business strategy. This IT-business alignment will ensure that organizations continue to achieve their strategies and goals, and implementing ways to evaluate its performance. One special aspect of IT governance is that it considers interests of all stakeholders and ensures that processes provide measurable results. This situation is possible with lateral IT governance structures, with involvement from all levels of management (Prasad et al., 2010).

Organizations can follow a few supporting mechanisms to guide their implementation of IT governance in organizations. The Control Objectives for Information and related Technology (COBIT) is an approach to standardize good information technology security and control practices. COBIT provides tools to assess and measure the performance of 34 IT processes of an organization (IT Governance Institute, 2007). The ISO/IEC 38500:2008, corporate governance of information technology, provides a framework for effective governance of IT to assist those at the highest level of organizations (International Organisation for Standardization, 2008). The standard assists top management to understand and fulfill their legal, regulatory, and ethical obligations in respect of their organizations' use of IT. The COSO framework, developed by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) provides guidance to organizations on critical aspects of organizational governance, business ethics, internal control, enterprise risk management, fraud, and financial reporting (COSO, 2009).

Organizations forming strategic alliances are not recent phenomena. However, developments in IT mean these alliances are changing in their form and structure (Langfield-Smith, 2008; Mayer and Teece, 2008; Weber and Chathoth, 2008). The competitive forces within today's turbulent business environment compel organizations to forge voluntary relationships for co-creation, co-development, and innovation (de Rond, 2003). Current IT resources enable formation of innovative organizational alliances — the COS. Such alliances function on a cooperative IT platform. Cooperative IT platforms would require different IT governance structures to monitor and manage the IT assets. Such governance structures require some aspect of dynamism to capitalize on emerging opportunities to sustain the alliances' competitive position. That is, IT governance becomes a shared responsibility within the collaborative organizational structures. This dynamism is possible

with some form of between-organization collaboration. The dynamic capabilities theoretical framework is one possible basis for suggesting and explaining such across-organizational collaboration to govern the IT resources. We discuss this framework in the next section.

3. Theoretical framework

Organizations are made up of a bundle of resources (Barney, 1991). Some of these resources are unique to organizations, allowing them to achieve distinctive outcomes compared to other organizations (Mata et al., 1995). Such distinctive outcomes, however, may be of little value in a collaborative atmosphere, because valuable outcomes in a collaborative environment are those that benefit all partners of the collaborative alliance. The product of combination of organizations' unique outcomes can help them manage the shared resources (Grant, 2008). That is, the resources would combine to form higher-level resources, which in the case of IT governance, are the co-created governance structures. A higher-level resource is the product of unique combinations (co-creation) of organizations distinctive resources and capabilities. The dynamic capabilities theoretical framework explains this level of resource organization, and forms the key basis for suggesting IT governance structures for collaborative alliances.

The higher-level resources are also dynamic resources with difficult-to-imitate combinations of organizational, functional and technological skills (Teece, 2007). Dynamic resources are those that adapt to the changing environments (Thomas, 1996). These resources form the foundation upon which distinctive and difficult-to-imitate advantages can be built, maintained and enhanced (Teece et al., 1997). Organizations that collaborate would appear to renew their collaborative competencies through innovative responses by appropriately adapting, integrating, and reconfiguring internal and external organizational skills, resources, and functional competencies (Teece et al., 1997). Dynamic IT governance structures are essential to achieve this outcome. Organizations past choices influence domains of competence, and at any given time, organizations must follow a certain trajectory of competence development (Teece et al., 1997).

Organizations can improve organization of certain types of economic activities internally (Coase, 1937). Competencies and capabilities, like governance structures, resulting from organizing and getting things done internally are the key components in sustaining advantages (Coase, 1937). This situation is because internal organization takes place in a more multilateral fashion, with patterns of behavior and learning orchestrated in a much more decentralized fashion (Teece et al., 1997). Processes, paths, and positions are factors that can help determine organizations distinctive competence and dynamic capabilities. These competencies and capabilities embed in organizational processes of one kind or another. The shared innovative changes between these processes explain the essence of the organizations dynamic capabilities and competitive advantage (Teece et al., 1997). The processes of collaborative alliance have a high level of coherence within themselves. The coherence provides the capabilities, and a cohesive set of inter-organizational linkages that is difficult to mimic. Shared IT resources across organizations require such coherent governance structures for their effective management. Partner organizations possess a hierarchy of capabilities, and general and broadly defined capabilities emerge from an integration of more specialized capabilities (Grant, 2008).

Governance of IT resources within collaborative organizational structures would require some form of inter-organizational linkages. The recursive IT governance-related learning would appear to be an important catalyst for continued success of collaborative structures. Organizations, thus, need to collaborate in various fronts within their collaborative structures to embrace both the sharing and management of resources. The dynamic capabilities lens forms the basis for exploring various forms of inter-organizational IT governance structures required to manage IT resources within COS. This effort must commence with a deeper understanding of the nature of the COS and the associated IT governance structures.

4. IT governance structures in IT-dependent collaborative alliances

The changed conditions of the IT-driven COS requires new structures of IT governance. The dynamic capabilities theoretical framework suggests a collective effort in governing the IT resources. The eventual objective of this study is to propose a model of IT governance and its evaluation within the COS. To the best of our knowledge, extant literature inadequately informs the nature and composition of the IT governance mechanisms, let alone providing empirical support for such mechanisms, for collaborative organizational

structures. A deeper understanding of the reality of the COS is required before we could suggest a model of IT governance and their effectiveness for COS.

Our overall research design includes an interpretive component and a field survey. We use these research methods consecutively. The outcomes of our interpretive design, the suggested IT governance structures for COS, become the key component of our field survey. We discuss our interpretive approach next, and the survey design in Section 6, which follows the development of hypotheses and the research model. A common approach to unpacking the diversity of issues involved in governance of IT resources within COS is to undertake an interpretive case study (Yin, 1994). The interpretive approach affords an in-depth look at the dynamic relationship that exists between partner organizations in governing the IT resources. This approach considers the shared meanings and experiences of the people involved (Walsham, 1995). One interprets these items from the perspectives of the individuals themselves, given that multiple realities exist in the organization, shaped by their experiences and actions. This effort becomes instrumental in making generalized assertions on the mechanics of governance of IT resources in a collaborative environment.

A large number of organizations today engage in some form of IT-related collaborative alliances (Turban and Volonino, 2011). Acquiring a deeper understanding of the possible IT governance structures within the collaborative alliances would mean extracting reality from the organizations that are at the forefront of using such alliances. Successful operation of the IT-dependent alliances implies existence of appropriate IT governance structures. We approached twelve organizations that are heavily involved in across-organization IT-dependent collaboration to manage their business processes. These organizations collaborate to manage their digital supply chain, manage e-channels and logistics, manage tourism and leisure services, and engage in collaborative commerce. We explained the purpose of the study to the organizations, the personnel of interest, and the nature of their involvement in this exercise. Five organizations agreed to participate in the study. These five organizations engage in various forms of IT-related collaboration to manage their processes.

From these five organizations, sixteen potential contacts volunteered to be interviewed. Each semi-structured interview lasted about thirty minutes. Table 1 presents the demographics of the interviewees. The collection of data from different management levels permits the elicitation of multiple viewpoints from individuals within the same division to contrast across divisions. The intent of this approach is to identify common conceptions that represent key structures for effective IT governance in COS. The interviews were semi-structured. The opening question was very general, seeking opinion on governance structures for collaborative organizational structures. The interviews then progressed with some focus around the co-created IT governance structures, but with enough flexibility to capture perceptions on various perspectives of IT governance.

We transcribed and analyzed the interview data for its thematic content, which involved identification of a number of conceptions relating to possible IT governance structures in COS. The conceptions related to co-created governance structures and provided a narrative of the mechanics of such structures. This

Table 1
Interviewee demographics.

Interviewee	Position	Age	Industry	Experience (years)
1	IT Manager	36	Retailing	8
2	Chief Information Officer (CIO)	41	Manufacturing	12
3	Manager Logistics	32	Transportation	13
4	Managing Director	55	Retailing	15
5	IT Manager	33	Communication	6
6	CIO	38	Banking	20
7	Department Manager	28	Distribution	6
8	Department Manager	29	Distribution	8
9	CIO	35	Banking	21
10	IT Manager	42	Retailing	8
11	Director Operations	49	Banking	12
12	CIO	48	Manufacturing	3
13	IT Manager	33	Communication	5
14	Operations Manager	39	Manufacturing	16
15	IT Manager	34	Distribution	13
16	Division Manager	45	Communication	12

Table 2
Broad conceptions and themes for IT governance in collaborative organizational structures.

Broad conceptions	Key themes
Co-Created IT Steering Committee	Shared IT Governance, Shared Resource Ownership, Lateral Decision Making, Broader Adaptation of the IT Resource
Inter-Organizational Lateral Communication System	Extensive Partner Communication, Alliance-Based Communication, Leveraging the Web 2.0 Communication and Collaboration Tools,
Inter-Organizational Performance Management System	Broader Metrics for Evaluating Performance, Shared Alliance Responsibilities, IT-Based Alliance Evaluation
Co-Created Operational Systems Committee	Operational Coordination, Operational Alignment, Operational Consistency

analysis helped to substantiate the co-created governance investigative framework. The conceptions emerged using the following steps (Dey, 1993). First was the establishment of the unit of analysis, which were the concepts from the interviewee's expressions ranging from a few words to complete sentences. The second step was code attachment, which act as labels on the unit of analysis and represent the conceptions prevalent in that section of text. The third step involved conception categorization into broader conceptions. These above steps required numerous read and analysis of the interview transcripts. We also provided copies of the transcribed notes and thematic analysis to the interviewees for verification and additional comments to ensure validity of our analysis.

Four broad conceptions emerged from the analysis of data. Table 2 summarizes the formations of these four broad conceptions. The following sections discuss these four broad conceptions.

4.1. Co-created IT steering committee

Co-created IT steering committee relates to the concept of sharing the management of IT resources within COS. The concept of sharing the management of IT resources in COS was a prevalent view of the interviewees. The interviewees suggested that the partners have some level ownership of the IT resources that form the COS. A sense of shared ownership of the resources was evident in the interviewees' views. This view persists even if they do not physically own such resources. One interviewee suggested:

> *"I think that in a collaborative environment, partners need to come to consensus on the benefit of the acquired IT resources. It is important that all parties are part of the decision-making, and see the value of IT in their organizations. This is only possible if all parties sit together and sort the issues out. When IT tries to benefit all parties in an alliance, individual partner decisions may be of little use." T3*

Another interviewee shared the following:

> *"I know this may not be easily done but an IT resource in a collaborative organizational structure must be valuable to all. If it is not suitable to one party, then the effort may not be adequate. The only way I see this happening is when all parties discuss the IT adoption strategy together and come to consensus. The way I see it is at all partners have a stake in the success of a IT project, so all need to come together to make sure that a share of their success is justified. Even if it means changing the business rules." T2*

The comments also indicate that organizations will need to establish new forms of cultures and structures to manage the IT resources that facilitate COS. Organizations need to adopt a liberal approach to IT governance where benefit beyond the organization needs consideration. A lateral across-organization decision-making structure is critical to ensure that IT resources provide adequate business value to all parties in IT-related alliances. The interviewees also shared the following views on this point.

> *"Look, we have come to a stage in business where our success may only come in an embracive business environment. IT has broken many barriers and we have weaker boundaries between organizations. If we are to survive, we are to work together – not only in sharing resources, but also in making decisions regarding those resources." T10*

"We need to work together to get the full benefits of IT in today's environment. We may not get much if we are too self-centered or become too complacent about what IT can do for us. We must build alliances and in various dimensions and work for the good of all parties." T8

4.2. Inter-organizational lateral communication

Inter-organizational lateral communication systems relate to the concept of expanding communication and collaboration within the organizations in the collaborative alliance. The interviewees considered this an essential IT governance structure. Organizations need to adopt a flexible approach with their relationship management and they should be willing to share their knowledge beyond their organization. The interviewees shared that an open communication approach with the will to share views and thoughts on the implications of current and prospective IT resources to the alliance is essential. This environment will accrue the alliance knowledge base on how best to leverage a shared IT infrastructure. Many interviewees shared that there is a need to embed this aspect of IT governance in their process-related interactions. This embedding requires extensive use of web 2.0 tools, perhaps in conjunction with other stakeholders. Much of this communication and collaboration may be informal. That is, good governance of IT resources should include considering their values recurrently in an interactive environment. Below are some of the views that the interviewees shared on this aspect.

"I think we need to pay special attention to how we share our views here. While we may meet formally to discuss our IT backbone, we need to have a much more open communication channels to share our views in a much more regular basis. Of course, this is not going to be easy, as each organization would like to maintain its competitive position. But, greater benefit in today's IT-intensive environment will come from how we share our IT-related knowledge with the alliance." T11

"I think the Web 2.0 tools itself is a key instrument for IT governance in today's business environment. We need to think about our IT 24/7 as this will determine how we can strengthen our alliance. We need to engage much more in a virtual context, and be available and thinking all the time about our IT. This too, must not be within us, but much more with others. In fact, I strongly feel that we need to make the 'them' into 'us.'" T14

"Two things must go hand-in-hand in today's IT dependent environment. One is doing business with others and the other is continually talking about business with others. These two aspects are very important and we must make sure that there is a vibrant informal communication going on all the time. There is no excuse for lack of this with the availability of rich virtual communication tools. We can only manage IT when we know all we need to know about IT." T3

4.3. Inter-organizational performance systems

Inter-organizational performance systems relate to the concept of evaluating the performance of an organization in a collaborative alliance within broader collaborative-based performance matrices. The interviewees considered this as an important IT governance structure for COS. This requirement is a difficult feat to achieve as the alliances in COS are less formal with no or thin ownership stakes. However, performance management systems that align the objectives of COS with future alliance agreements or reward structures would ensure the longevity of the collaborative arrangements. Misaligned performances would result in suboptimal use of the IT resources between the organizations. The result of this action would affect the entire alliance, despite full commitment by some. Presence of some form of opportunity cost for suboptimal performance is necessary for the effective use of the IT resources within the alliances. The interviewees shared the following views on this concept of IT governance for COS.

"There has to be some way to share the responsibilities. If we do not share responsibilities, we may get into the concept of free riders. This will not be good for the alliance. One of the ways this could be achieved is to evaluate performance of the structure rather than individuals. This could also be done in a hierarchical manner, where the performance of organizations is cumulated into the overall alliance performance. While I think it is

important that IT-related decisions are made with the interest of the organizations, the broader benefit of the alliance must also always come in consideration." T15

"I think there is a need to review what an organization is doing for others. This is especially important, as in today's environment, the benefit of IT will only emerge if it is shared across organizations. Motivation for such initiative can only come with parallel performance systems." T8

"One important issue that I see for governance of IT resources with shared benefits is shared performance evaluation. There will be issues if performance is disintegrated from the structure of the collaborative use of IT resources. Performance also needs to be considered as one. I think there needs to be a broader metrics for performance evaluations in today's interconnected business environments." T11

4.4. Co-created operational systems

Co-created operational systems committee relates to the concept of inter-organizational cohesion by operational managers at the process level. Organizations consume most of the IT resources at the process levels. This situation presents an interesting shift from strategic and performance issues to operational issues. The interviewees felt that operational level management staff is important within the COS. While the IT-related alliances emerge for various purposes, they all relate to managing various forms of business operations. That is, due consideration to the processes is essential. The interviewees suggested some form of formal assembly of operational level management to ensure operational alignment between the parties in an alliance. Some of their views are as follows.

"I think there needs to be regular meetings at the operational level. This is a must for good IT governance for IT-related joint organizational structures. We may discuss a lot at the top level, but we may not be too successful if we do not coordinate our activities at the lower levels. There is much happening at the lower level that needs adequate attention." T7

"One aspect that I think is an important way to govern IT resources is to focus on aligning the operations of the parties in an IT-related alliance. This is only possible with regular and open between-organization communication and collaboration at the operations level. We need to ensure that we not only make decisions to get the right IT tools for the group, but also to use it in the right way for the benefit of all in the group." T6

"One group of people that need to blend well in today's business arrangements is the low level management. Much of the IT is used to manage and coordinate the processes. We need to have formal structure at this level. Perhaps we need to establish a committee that meets at regular interval and manage the coordination of processes between the parties in this group. This is very important for operational good of the group. One of the reasons we make alliances outside an organization is because we can do better with them compared to doing things ourselves. But if we do not communicate and share our position with our operations, we may achieve very little." T15

4.5. Summary

COS present challenges in managing the involved IT resources. A rethink of IT governance structures for such dynamic and fragile alliances is required. The proliferation of Web 2.0 resources mean that organizations' engagement into collaborative alliances would appear to grow exponentially. Similarly, our thinking of effective ways to govern the IT resources in this environment must incorporate this environment. A deeper understanding to manage the IT resources in this environment is important to develop a model for effective IT governance for COS. Interpretive interaction presents important industry views on the IT governance structures required to manage the IT resources. The interviewees provide important insights based on their experiences with operating in collaborative alliances.

The four structures discussed above embrace various IT-related governance aspects of the COS. This set includes structures for governing IT at the strategic and operational levels by the alliance partners. Such

lateral IT governance design is important to ensure consideration on IT at decision-making (strategic) and at the IT-usage (operational) levels. The result of this approach would be a comprehensive consideration on IT by the alliance as whole. This approach will also ensure a fit between the IT adoption decisions and the IT-usage decisions. A salient issue is that organizations need to make these considerations in a collective environment — in a co-created environment. Individual governance initiatives by partners in the alliance may prove futile because the alliances need to evaluate the success in totality.

An open communication system for managing the IT resources is also important within today's collaborative organizational structures because much of the strength of today's alliance structures rests with the level of understanding of the mechanics of the collaboration. Absence of ownership-based alliance, which occurs in the COS, means that trust and integrity will play an important role in the sustainability of these structures. Open across-organization communication regarding the adoption and use of IT is essential in this context. Indeed, it may be the most important IT governance structure with today's alliances. Fostering this form of communication will require much sacrifice in terms of sharing corporate strengths relating to IT. Accordingly, an important complementary IT governance structure would be a congruent alliance-based performance measurement system. Such a system may be a difficult venture within COS, but is an important IT governance mechanism to ensure continued trust in the alliance.

The interpretive study informs us about the IT governance structures for collaborative alliances. Understanding on the IT governance structures only, however, is not enough to promote a representation of IT governance for COS. A mechanism to evaluate the effectiveness of the IT governance structures is also required. Prasad et al. (2010) suggest a capabilities-based approach for assessing the effectiveness of IT governance structures. This study adopts a similar approach in evaluating the effectiveness of IT governance structures for collaborative organizational structures. We extend this approach and argue that organizations' IT governance structures should help organizations sustain their IT-related capabilities.

Sustainable IT-related capabilities will ensure that organizations continue to leverage the potential of available IT resources. This means that organizations level of sustainable IT-related capabilities are the ideal measure of the effectiveness of their IT governance structures. Organizations' ability to leverage their IT resources with their sustainable IT-related capabilities should relate to their ability to improve their process-level performance. Improvement business processes should then lead to firm-level performance. Fig. 2 conceptualizes this approach.

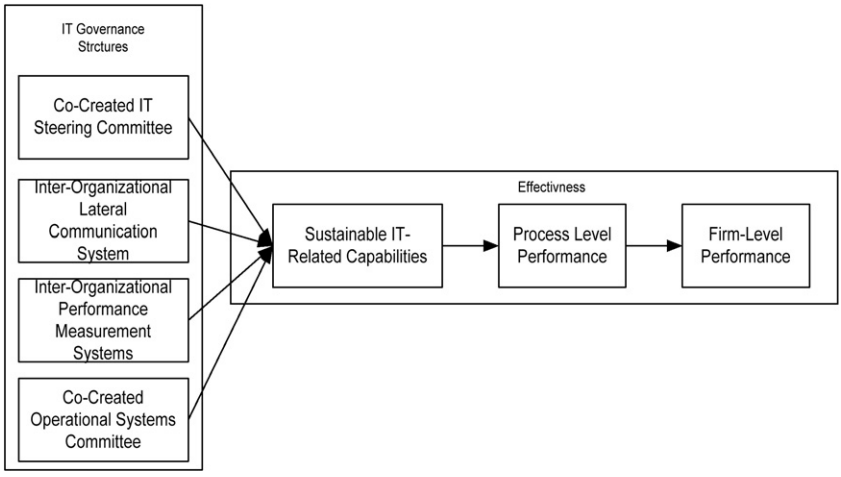

Fig. 2. Extended conceptual model.

5. Hypothesis development

5.1. IT governance structures, sustainable IT-related capabilities and measures of business value

Prior research suggests the IT-related capabilities, and their nature of relationships to various measures of performance (e.g., Mata et al., 1995; Feeny and Willcocks, 1998; Byrd, 2001). Organizations' IT-related capabilities contribute to various measures of IT-related business value (Powell and Dent-Micallef, 1997; Santhanam and Hartono, 2003; Wade and Gravill, 2003; Ray et al., 2005). IT resources, however, are dynamic and evolve exponentially. These new resources provide organizations with new opportunities to sustain their competitive advantage.

This aspect is the driving force behind the COS. For example, organizations are digitizing their supply chains with RFID technologies, and engaging in collaborative commerce with richer social networking tools. Organizations that are part of COS require sustainable IT-related capabilities to leverage the dynamic IT resources. Sustainable IT-related capabilities are organizations' unique IT-related resources that leverage the potential of the new IT resources.

A supported way to evaluate the effectiveness of IT governance structures is to understand their ability to contribute to building these IT-related capabilities (Prasad et al., 2010). This study extends this notion and suggests that effective IT governance structures in COS should help an organization sustain their IT-related capabilities. That is, IT governance structures should contribute towards the development of sustainable IT-related capabilities. Research has identified a number of IT-related capabilities that are a source of IT-related business value, in particular, the IT-related management capabilities, and IT-related infrastructure capabilities.

Two IT-related management capabilities — top management commitment towards IT and shared organizational knowledge between and unit and IT managers, and one IT-related infrastructure capability — flexible IT infrastructure have featured prominently in IT-business value research. These capabilities focus on the top-level and the middle-level management, and on a organization's IT infrastructure. Together, they appear to constitute key IT-related business elements, and their sustainability would ensure appropriate business value of the acquired IT resources.

We evaluate the IT governance structures for COS against these sustainable IT-related capabilities and subsequently to processes and firm-level measures of business value to obtain a deeper understanding of the effectiveness of such governance structures. Fig. 3 presents this research model representing the above arguments. The following sections provide detailed description of the research model.

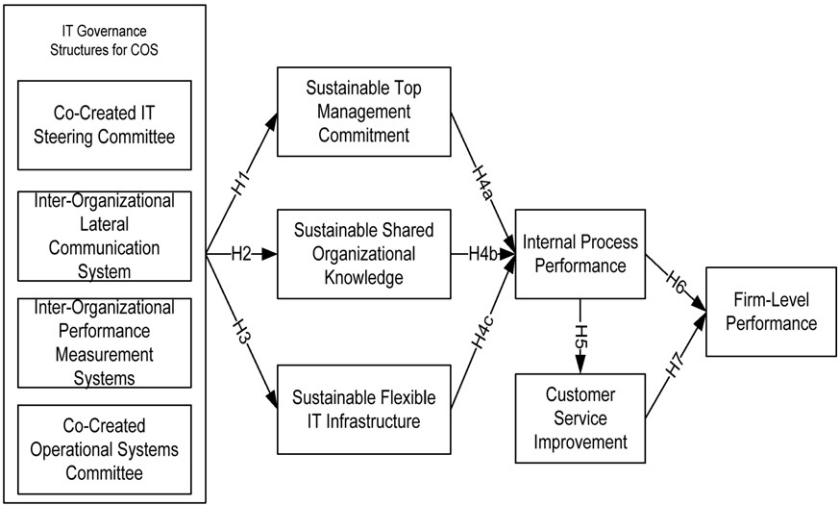

Fig. 3. Research model.

5.2. IT governance structures in COS and sustainable top management commitment towards IT

Successful use of IT in organizations requires top executives to act as business visionaries and provide appropriate directions for IT-related initiatives. Top management support is important to articulate the need for IT and communicate its functionality within the context of the organization's strategy, structure and systems (Henderson and Venkatraman, 1993). This aspect of top management support is crucial when organizations are part of the COS. Continuous support of this nature will enhance the success of IT resources by making IT resources available, and supporting and guiding the IS functions for the good of the COS. Continuous commitment of this nature also helps integrate IT with business strategies and processes, and ensures continuity in IT investments over time (Ross et al., 1996; Powell and Dent-Micallef, 1997; Wade and Hulland, 2004). The lack of such support may see IT resources having little effect on performance, even when substantial investments are made to acquire or develop these resources (Wade and Hulland, 2004). This situation will also see underutilization of IT resources within COS. Sustained top management commitment to IT-related initiatives is an important IT-related capability that will ensure the continuity of the COS.

Organizations require timely and quality information to identify and leverage emerging IT-related opportunities. The suggested IT governance structures for COS will provide information to top managers with immediate potential to become knowledge for the organization. The suggested governance structures will channel this information to the top managers. Top managements' ability to create knowledge will see continuous support for IT-related initiatives that has implications for the organization and the COS. The common understanding established through a co-created IT steering committee will galvanize management's commitment towards the COS. The commitment will see top management in all participating organizations being more committed to the objectives of the COS.

Organizations require a coordinated effort in planning, organizing, controlling, and directing the deployment of IT resources (Boynton and Zmud, 1987; Karimi et al., 2000). Top management of all participating organizations plays a crucial role in promoting this coordination. Governance structures that promote coordination between organizations at the strategic, tactical, and operational levels will acts as important catalysts in sophisticating this IT management role. These IT governance structures will secure and sustain top management support for various IT-related initiatives within their COS. We suggest that:

H1. *Co-created IT steering and operational systems committees, and inter-organizational lateral communication and performance management systems will positively influence the level of continued top management commitment to IT-related initiatives within the COS.*

5.3. IT governance structures in COS and sustainable shared organizational knowledge

Shared organizational knowledge is the shared understanding on the benefits of IT resources between the Unit and IT managers. This is an important IT-related capability for an organization. This understanding determines the strategic use of IT in an organization (Rockart, 1988; Henderson, 1990; Boynton et al., 1994; Ray et al., 2005). The benefit of this IT-related capability can also expand to the COS. The shared IT-related knowledge between IT and Unit managers within an organization, and between organizations in a COS will bind the IT and Unit Managers (Boynton et al., 1994). This shared knowledge will determine how organizations use IT resources in support of their processes, and how the processes related to the activities of partners in the COS.

A major capacity of the COS would lie in their ability to exchange knowledge continually on how to synchronize the business processes of the parties. The depth of this dynamic capacity will be contingent upon the conjunction of IT and business-related knowledge possessed and exchanged amongst the IT and Unit Managers (Ray et al., 2005). Sustainable shared organizational knowledge will enhance the performance of specific processes within the COS, and increase the operational and service performance coordination of the collaborative teams (Nelson and Cooprider, 1996). Sustainable, shared organizational knowledge will contribute to IT assimilation within the COS. The result of this outcome will be an enhanced level of IT-business alignment between the partners of a COS.

The discussed IT governance structures for COS will provide visibility and transparency of the IT initiatives (Earl, 1989). The result of this outcome is a consensus on value of IT across the partners within a COS. This environment will promote the understanding required to leverage the IT resources continually. COS sophisticates organizations IT infrastructure because the IT resources must demonstrate value beyond

the adopted organization. The assimilative capability of different types of management is an essential commodity in this environment (McFarlan, 1984; Raho et al., 1987). Unit managers play a critical role in setting high-level architectures and act as advocates for effective IT governance (Weill and Ross, 2004). The suggested governance structures of the COS suggest collaboration within an appropriate mix of business and IT executives. This collaboration will ensure strategic alignment with the partners, a balanced portfolio of IT investments, and close coordination of business and IT in the COS. The governance structures are the ideal vehicle to ensure congruent vision of partners of the COS, including the IT and Unit managers. The result of this congruent vision would be a common understanding of the benefits of IT to the alliance. The learning from the resultant interaction within the alliance develops a sustainable capability of a unique understanding between the users and managers of technology in the alliance. We suggest that:

H2. *Co-created IT steering and operational systems committees, and inter-organizational lateral communication and performance management systems will positively influence the level of sustained shared organizational knowledge within the COS.*

5.4. IT governance structures in COS and sustainable flexible IT infrastructure

IT infrastructures are the foundation for the establishment of the COS. IT infrastructure is a shared set of capital resources that provide the foundation on which IT applications are built (Duncan, 1995). Organizations form alliances to obtain or maintain competitive advantage. A flexible set of IT infrastructures will mean that the partners in the alliance obtain opportunities continuously to leverage their resources uniquely for competitive advantage. A flexible IT infrastructure facilitates rapid development and implementation of IT applications for the COS. These IT applications will enable organizations to respond swiftly to take advantage of emerging opportunities (Ray et al., 2005). The shared and sustainable flexible IT infrastructure of the alliance would be its unique IT-related capability. The path-dependence of the infrastructure means there can be significant differences across organizations or alliances in the constitution of this infrastructure. The IT infrastructure differences are long-term because infrastructure redevelopment is a time consuming and a costly process. Its ability to provide new opportunities to the members will be contingent upon timely IT-related decisions that give life to the IT infrastructure. This outcome is possible through the suggested IT governance structures.

The suggested co-created steering and operational systems committee will blend the understanding of the operational managers and the top executives. The inter-organizational performance and communication systems will ensure that the IT-related decisions have prime value for the alliance. These structures would lead to agility and leadership in exploiting and managing IT. This agility will result in dynamic resource allocation and exploitation (Thomas, 1996). The result will be a structure, flexible and intelligent enough to identify competitive opportunities, and capitalize on existing strengths (Thomas, 1996). Importantly, these IT governance structures promote a shared vision that contributes dynamics to flexible IT infrastructure. The parties in the alliance will be agile, and vision how current IT infrastructure could facilitate leveraging of potential opportunities. The suggested IT governance structures will play an important role in sustaining a flexible IT infrastructure through the alliances cooperative initiatives. We suggest that:

H3. *Co-created IT steering and operational systems committees, and inter-organizational lateral communication and performance management systems will positively influence the level of sustained flexible IT infrastructure within the COS.*

5.5. Sustainable IT-related capabilities and process-level performance

Relating IT governance structures of COS to sustainable IT-related capabilities renders an incomplete assessment of the effectiveness of the IT governance structures. Organizations acquire IT resources to enhance their core business processes (Davenport, 1990; Alter, 2003). This means that organizations efforts relating to their IT-related capabilities that benefited from their IT governance initiatives must be visible in their business processes. IT resources have a direct and immediate impact on the internal processes (Davenport, 1990; Alter, 2003). The sustainable IT-related capabilities will ensure the efficient and effective of the use of IT at this process level.

Sustainable top management commitment will make IT resources available at the right time for the benefit of the COS. This commitment will also support and guide the IS functions, and integrate IT with business strategy, and processes (Powell and Dent-Micallef, 1997). These commitments enhance the influence of the IT resources on business process performance of the COS (Ross et al., 1996; Powell and Dent-Micallef, 1997). Uncoordinated efforts may bring ad hoc benefits, but not adequate to create and manage competitive advantage. Sustainable top management commitment is an important IT-related capability because it enhances IT resources ability to contribute to business process performance of the collaborative alliance.

Shared organization knowledge between IT and Unit managers also contributes to process performance (Nelson and Cooprider, 1996; Ray et al., 2005; Jeffers et al., 2008). Ray et al. (2005) found a positive relationship between the shared knowledge and the customer service process. They noted that the level of common knowledge and understanding between the IT and the line managers regarding the use of IT to improve process performance is a critical factor in successful utilization of IT in the pursuit of business objectives. Nelson and Cooprider (1996) found that an increasing level of shared knowledge between IS and line groups are linked with increased operational and service performance of the IS groups. Jeffers et al. (2008) found that the level of shared knowledge is an important IT management related capability, in that it is positively associated with third party logistics processes.

Flexible IT infrastructure is another capability that influences a firm's ability to use IT to manage their business processes (Duncan, 1995; Armstrong and Sambamurthy, 1999; Ray et al., 2005). The flexibility of the infrastructure makes cost, pace, and value of IT-enabled innovation different for different firms (Duncan, 1995; Broadbent and Weill, 1997), Ray et al. (2005) found that the flexibility of IT infrastructure allows firms to implement IT applications to support customer service more efficiently and effectively, and this explains differences in performance of customer service. Flexible IT infrastructure allows firms to implement IT applications to achieve efficiency and effectiveness in their internal processes and improving their performance. We suggest that:

H4a. *Sustainable top management commitment to IT initiatives in a collaborative alliance will positively influence internal process-level performance of the alliance partners.*

H4b. *Sustainable organizational knowledge between IT and Unit managers in a collaborative alliance will positively influence internal process-level performance of the alliance partners.*

H4c. *Sustainable flexible IT infrastructure in a collaborative alliance will positively influence internal process-level performance of the alliance partners.*

5.6. Internal process performance and improvement in customer service

Organizations' ability to manage their external processes is contingent upon the strength and agility of their internal processes. Ensuring customer satisfaction is an important external activity for any organization. The relationship between customer satisfaction and firm productivity is an important issue (Anderson et al., 1997; Singh, 2000; Liao and Chuang, 2004). Organizations should pursue superiority in both customer satisfaction and productivity. Organizations sustainable IT-related capabilities will promote automation of internal processes, improve existing technology, and reallocate resources through changes in strategy, processes, and organizational structure.

These efforts will refine internal processes and enhance firm productivity (Stigler, 1942; Anderson et al., 1997). Frontline employees will benefit from these enhancements. Organizations engage in collaborative alliances to manage two important stakeholders, the suppliers and the customers. The cohesive environment that a COS provides will also help in managing any tension between satisfying the managements' and customers' expectations simultaneously, a common source of employee stress (Singh, 2000). Advocates of existence of trade-off between productivity and improved customer service suggest that appropriate applications of IT improve both customer satisfaction and productivity simultaneously (Anderson and Fornell, 1994). We suggest that:

H5. *Internal process-related performance will positively influence improvement in customer service.*

5.7. Process performance and firm-level performance

Engaging in collaborative alliance will mean additional investment in IT, thus consumption of financial resources. This means the monetary return on the IT investment is always of a concern for the businesses. IT resources have a direct influence on business processes performance and an indirect influence on the firm-level performance (Dehning et al., 2007). This means that an organization's firm-level performance depends on, amongst other factors, the effectiveness of the business processes in supporting the business goals (DeLone and McLean, 2003). Improvements in effectiveness and efficiency of the business processes will reflect on the firm-level performances of return on equity (ROE) and return on assets (ROA). Organizations that can develop and sustain their IT-related capabilities with IT governance initiatives will generate greater IT-relate benefits at the process level, and this will be reflected in their overall firm-level measure of business health (Barua et al., 1995; Melville et al., 2004). We suggest that:

H6. *Internal process performance will positively influence firm-level performance.*

H7. *Customer service improvement will positively influence firm-level performance.*

6. Research design

We discussed earlier that an initial interpretive design helped us identify suitable IT governance structures for COS. We do not repeat that deliberation here but rather we discuss the survey research approach that we employed to collect data to validate our research model.

6.1. A survey research approach

This study uses a field survey to collect data to validate the proposed model. This field survey allows data collection from a broad area and is the best way to reach the geographically dispersed contacts. This approach was especially important in this study as COS are established to manage processes with partners over disperse geographic locations.

6.2. Instrument development and test

Our interpretive approach supported the IT governance structures established in our model to manage the IT resources in COS. Accordingly, the current study required development of new measures for these constructs. Measures exist for sustainable IT-related capabilities and business value. Because prior research used these measures in different contexts, revalidation of these existing measures was also necessary. This study adopted the approach suggested by Davis (1989) and Moore and Benbasat (1991) to validate the measures. The validation steps included item generation, item sorting and refinement, and a pilot test. Ten fellow faculty colleagues with interest and expertise relating to this research participated in the item sorting and refinement processes. The sorting inter-rater scores, the Cohen's Kappa (κ), indicated that the inter-rater reliability for the participants was within the full agreement range ($\kappa = 0.60–0.80$) or within the almost perfect agreement ($\kappa = 0.81–1.00$). Twenty graduate students from an MBA course representing organizations that engage in some form of IT-based collaboration participated in pilot test. Preliminary factor analysis of the pilot test data using a component-based package indicated that the data exhibited normal measurement qualities. Appendix 1 presents the final measurement items for the constructs in the research model.

6.3. Sampling frame and survey administration

We obtained company details, including their contact information, from the ORBIS database. ORBIS is a publication of Bureau van Dijk Electronic Publishing (BvDEP). Our initial sample selection was non-random as we targeted companies with potential collaborative opportunities. We then browsed the company websites, and contacted them by phone and email for information on their IT-based collaboration. Seven hundred and forty one target respondents (companies) from this database constituted the sampling frame of this study. Dillman's (2007) methodology was followed in developing and administrating the online research instrument.

We approached the contacts with the initial instrument package delivery and two reminders. At the conclusion of the instrument administration process, we received 118 valid responses, a response rate of 15.90 percent. This response rate is comparable to other studies involving senior executives (e.g., Jeffers et al., 2008). The contacts that responded represented firms from the major industries (Banking, Finance, Hospitality, Tourism, Travel, Media, Entertainment, Publishing, Retail, Wholesale, Distribution, Telecommunications, Transportation, and Logistics). The respondents included the Director of Management Information Systems, and Chief Information Officers, with good industry experience.

6.4. Diagnostics

We tested for the non-response bias with first and the last thirty responses for all measures and did not find any significant differences on any of the variables. Examination of common methods variance using Harman's single-factor test, where all the items were subject to exploratory factor analysis (EFA), revealed common methods variance was not an issue. More than one factor emerged from un-rotated factor solutions, and more than one factor explained the majority of the variance. A small number of responses contained missing data, and Little's MCAR test yielded data to be missing completely at random ($p = 0.441$). Maximum likelihood estimation (MLE), implemented by the EM (expectation maximization) algorithm in the SPSS Missing Values option imputed the missing data.

Table 3
Factor loadings and cross loadings.

	COSC	CTSC	CUST	FRMP	ILCS	IOPS	PROP	SFLX	SSOK	STMC
COSC1	**0.828**	0.417	0.467	0.499	0.126	0.474	0.477	0.348	0.548	0.562
COSC2	**0.765**	0.494	0.714	0.340	0.054	0.363	0.332	0.286	0.179	0.240
COSC3	**0.818**	0.417	0.371	0.394	0.085	0.424	0.413	0.324	0.269	0.298
CTSC1	0.360	**0.885**	0.452	0.429	0.120	0.439	0.403	0.368	0.297	0.339
CTSC2	0.365	**0.894**	0.314	0.340	0.054	0.363	0.332	0.286	0.179	0.240
CTSC3	0.418	**0.917**	0.671	0.394	0.085	0.424	0.413	0.324	0.269	0.298
CUST1	0.413	0.465	**0.907**	0.429	0.090	0.498	0.508	0.420	0.316	0.385
CUST2	0.541	0.423	**0.847**	0.329	0.196	0.364	0.385	0.309	0.278	0.290
CUST3	0.499	0.470	**0.851**	0.401	0.118	0.411	0.356	0.275	0.291	0.351
FRMP1	0.407	0.389	0.423	**0.972**	0.224	0.493	0.566	0.324	0.381	0.436
FRMP2	0.489	0.399	0.437	**0.951**	0.233	0.769	0.591	0.350	0.373	0.421
FRMP3	0.667	0.460	0.413	**0.920**	0.227	0.785	0.505	0.348	0.316	0.383
ILCS1	0.127	0.093	0.102	0.270	**0.819**	0.190	0.079	0.225	0.097	0.109
ILCS2	0.081	0.039	0.103	0.169	**0.837**	0.139	0.113	0.276	0.112	0.117
ILCS3	0.098	0.129	0.174	0.168	**0.848**	0.102	0.049	0.211	0.080	0.125
IOPS1	0.428	0.417	0.467	0.399	0.126	**0.974**	0.677	0.348	0.548	0.562
IOPS2	0.321	0.448	0.431	0.333	0.250	**0.793**	0.519	0.349	0.362	0.402
IOPS3	0.328	0.417	0.467	0.499	0.126	**0.974**	0.677	0.348	0.548	0.562
PROP1	0.594	0.391	0.353	0.513	0.016	0.615	**0.815**	0.333	0.555	0.549
PROP2	0.505	0.337	0.401	0.497	0.097	0.546	**0.890**	0.549	0.534	0.586
PROP3	0.575	0.390	0.495	0.510	0.133	0.616	**0.883**	0.523	0.618	0.663
SFLX1	0.341	0.297	0.366	0.386	0.274	0.363	0.494	**0.904**	0.360	0.479
SFLX2	0.294	0.237	0.245	0.235	0.190	0.292	0.444	**0.780**	0.409	0.449
SFLX3	0.393	0.400	0.381	0.287	0.265	0.306	0.465	**0.869**	0.333	0.368
SSOK1	0.325	0.184	0.224	0.220	0.046	0.378	0.554	0.292	**0.860**	0.763
SSOK2	0.434	0.235	0.299	0.380	0.143	0.526	0.523	0.347	**0.895**	0.619
SSOK3	0.446	0.300	0.342	0.357	0.106	0.468	0.614	0.446	**0.814**	0.515
STMC1	0.428	0.330	0.368	0.383	0.176	0.445	0.593	0.493	0.592	**0.770**
STMC2	0.367	0.210	0.260	0.296	0.045	0.418	0.617	0.379	0.568	**0.863**
STMC3	0.472	0.285	0.358	0.407	0.126	0.533	0.525	0.383	0.566	**0.857**

CTSC — Co-Created IT Steering Committee, ILCS — Inter-organizational Lateral Communication Systems, IOPS — Inter-Organizational Performance Systems, COSC — Co-Created Operational Systems Committee, SSOK, Sustained Shared Organizational Knowledge, SFLX — Sustained Flexible IT Infrastructure, STMC — Sustained Top Management Commitment, CUST — Customer Service, PROP — Internal Process-Level Performance, FRMP — Firm-Level Performance.

7. Results

7.1. A components-based approach to model testing

We used partial least squares (PLS), a components-based structural equation modeling (SEM) program to test the theoretical relationships amongst latent variables (structural path) and the relationship between latent variables and its indicators (measurement paths). PLS is suitable for application and prediction (Chin et al., 2003). PLS assumes that all the measured variance is useful variance, and estimates the latent variables as exact linear combinations of the observed measures, avoiding the indeterminacy problem and providing an exact definition of component scores (Chin et al., 2003).

7.2. Measurement model

Confirmatory factor analysis (CFA) showed the factor loadings for constructs load highly only on their designated constructs. Measurement items have a factor loading mostly above the rule of thumb of a loading of 0.70, indicating at least 50% of the variance in the manifest variable is accounted for by the construct (Hair et al., 2008). Cross-loadings analysis revealed the manifest variables load highly only on the desired latent variable. There are high cross loadings between PROP and IOPS, SSOK, STMC and FRMP. Table 3 presents factor loading and cross loadings.

Table 4 presents the results of measurement model assessment, including Cronbach's alpha, average variance extracted, composite readability, and inter-construct correlations. The alpha coefficients of all constructs was higher than 0.70 (Nunnally, 1978). The more accurate composite reliabilities, which avoid the assumption of equal weightings, were above 0.80. The average variance extracted were all above the acceptable 0.50 level (Chin, 1988). The square root of average variance extracted, which represents the average association of each construct to its measures, was higher than the correlations with the other constructs. This statistics indicates that the construct closely relate to its own measures rather than to those of other constructs. Table 4 shows the square root of average variance extracted diagonally in bold.

7.3. Structural model

This study considers the suggested IT governance structures in totality. That is, this study presents the culmination of the individual structures as a higher order factor. This approach is consistent with the objective of this study of suggesting a set of governance structures for collaborative alliances. This approach also reduces the number of path coefficients in the structural model, thus improving the validity of the findings. The results of the analysis of the higher order IT governance factor indicates all IT governance factors favorably

Table 4
Measurement properties.

	AVE	CRA	COR	COSC	CTSC	UST	FRMP	ILCS	IOPS1	PROP	SFLX	SSOK	STMC
COSC	**0.646**	**0.757**	**0.845**	**0.804**									
CTSC	**0.808**	**0.882**	**0.926**	0.626	**0.899**								
CUST	**0.755**	**0.839**	**0.902**	0.519	0.595	**0.869**							
FRMP	**0.898**	**0.943**	**0.964**	0.453	0.437	0.448	**0.948**						
ILCS	**0.697**	**0.784**	**0.874**	0.121	0.100	0.149	0.241	**0.835**					
IOPS	**0.842**	**0.903**	**0.941**	0.634	0.460	0.494	0.624	0.173	**0.917**				
PROP	**0.745**	**0.829**	**0.897**	0.445	0.431	0.486	0.586	0.099	0.686	**0.863**			
SFLX	**0.727**	**0.811**	**0.888**	0.404	0.368	0.392	0.359	0.288	0.377	0.548	**0.853**		
SSOK	**0.734**	**0.819**	**0.892**	0.473	0.284	0.341	0.377	0.117	0.538	0.660	0.427	**0.857**	
STMC	**0.691**	**0.774**	**0.870**	0.509	0.332	0.397	0.437	0.140	0.561	0.697	0.505	0.694	**0.831**

CTSC — Co-Created IT Steering Committee, ILCS — Inter-organizational Lateral Communication Systems, IOPS — Inter-Organizational Performance Systems, COSC — Co-Created Operational Systems Committee, SSOK, Sustained Shared Organizational Knowledge, SFLX — Sustained Flexible IT Infrastructure, STMC — Sustained Top Management Commitment, CUST — Customer Service, PROP — Internal Process-Level Performance, FRMP — Firm-Level Performance, AVE — Average Variance Extracted, CRA — Cronbach's Alpha, COR — Composite Reliability.

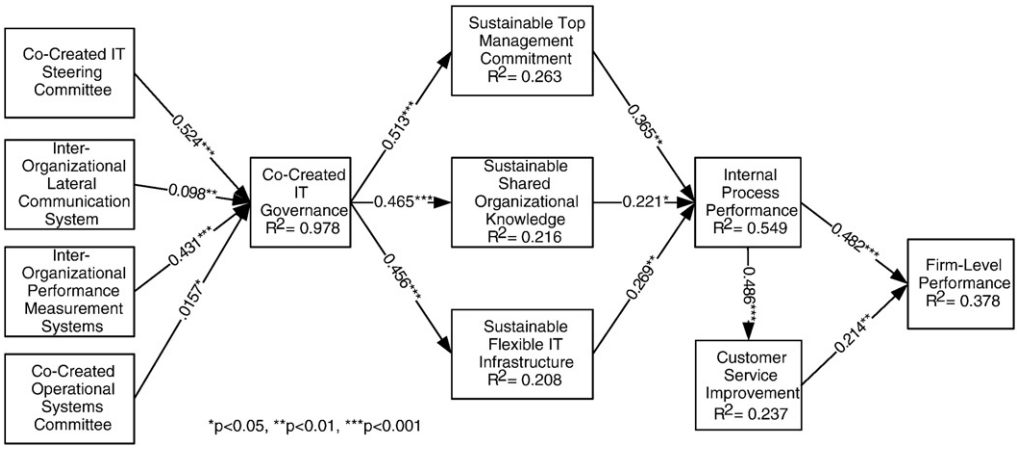

Fig. 4. Structural model.

and significantly contribute to this higher order factor. The significant path coefficients range from 0.098 (2.824) (ILCS) to 0.524 (4.953) (CTSC). The four structures share 97.8% variance with the higher order factor.

The higher order IT governance factor significantly and favorably influences the three sustainable IT-related capabilities. This higher-level governance structure explains 26.3% variance in STMC (pc = 0.513***), 21.6% variance in SSOK (pc = 0.465***), and 20.8% variance in SFLEX (pc = 0.456***). These outcomes support H1-H3. The three sustainable IT-related capabilities favorably and significantly relate to internal process-level performance. They explain 54.9% variance in the internal process-level performance with strong associations, STMC (pc = 0.365**), SSOK (p = 0.221*), and SFLX (0.269**). These outcomes support H4-H6.

The internal process-level performance favorably and significantly impact customer service improvement (pc = 0.486***), and it explains 23.7% variance in the customer service improvement. This outcome supports H7. The internal process-level performance and customer service improvement also favorably and significantly impact firm-level performance. Together, they explain 37.8% variance in firm-level performance, and they have strong associations with PROP (pc = 0.482***), and CUST (pc = 0.214**). These outcomes support H8-H9. Overall, the analysis reveals a strong fit of the data to the suggested IT governance model for collaborative alliances. Fig. 4 presents the outcome of all the above associations between the IT governance structures, the sustainable IT-related capabilities, and business value.

8. Discussion

The emergence of web 2.0 tools presents organizations with opportunities to engage in various forms of collaborative alliances (McAfee, 2009). These alliances present new challenges to organizations in managing their IT resources. This situation arises because organizations now have to consider the ramifications of their IT-related decisions in a wider collaborative jurisdiction. Organizations require new forms of arrangements to mange and make decisions relating to their IT. This study suggested a dynamic capabilities framework as the basis for possible IT governance structures for the COS. This suggestion is based on the premise that across-organization IT use requires across-organization collaborative governance mechanisms at various levels of the organizational hierarchy (Dyer and Singh, 1998).

An interpretive design informed us of the various IT governance structures required to manage and leverage the IT resources within the COS. Interviews with contacts from organizations that actively engage in collaborative alliances revealed the need for co-created IT governance structures. Importantly, organizations require these co-created IT governance structures within various levels of the organizational hierarchy. These IT governance structures need to focus on decision making, mostly at the strategic level, collaboration and communication on ways leverage the IT resources, and across-organization performance evaluation systems. These IT governance structures present an embracive approach to managing IT resources within collaborative alliances. This effort of identifying suitable IT governance structures for

collaborative alliances is an important one because the proliferation of collaborative tools will see organizations continue to engage in various forms of collaborative alliance to obtain or sustain their performance in the current global economy(Turban and Volonino, 2011).

Organizations must also be able to understand ways to evaluate their IT governance efforts. This understanding is important because it determines the effectiveness of the adopted IT governance structures to manage and leverage the IT resources. Unchecked governance approaches may result in ineffective use of IT resources within organizations. This study recognizes the dynamic proliferation of IT resources, in that organizations continually have access to new and capable IT resources. Organizations' ability to leverage such dynamic resources is contingent upon their ability to renew their IT-related competences to understand and recognize the opportunities offered by the modern IT resources (Teece, 2007). Respectively, this study proposed and evaluated the effectiveness of the IT governance structures for collaborative alliance against organizations ability to sustain their IT-related capabilities.

The results showed that for COS, their IT governance efforts relate to their ability to sustain their IT-related capabilities. That is, organizations' IT governance structures set the platform for organizations to understand and use the newly acquired IT resources effectively. This outcome is important for the COS because these organizations' ability to maintain their competitive position with collaborative alliances will be contingent upon their ability to make innovative use of shared IT resources to refine their across-organization business processes. This study considered IT-related capabilities of top management commitment towards IT initiatives, shared organizational knowledge between IT and non-IT managers, and a flexible IT infrastructure. These IT-related capabilities are essential to form and sustainably leverage the COS (Ray et al., 2005).

Ultimately, organizations' IT-related abilities and capabilities must contribute to business value (Ravichandran et al., 2009). This study considered the influence of the sustainable IT-related capabilities on measures of business value at the business process and the firm levels. IT governance structures do not directly affect business value. They rather influence the business value through creating and sustaining the IT-related capabilities. The suggested model, however, allows one to infer whether organizations' IT governance structures indirectly contribute to their business value. The results suggest that organizations' sustainable IT-related capabilities (STMC, SSOK, and SFLX) improve the effectiveness and efficiency of their internal business processes. This outcome indicates organizations that are part of COS are able to leverage the IT resources to improve the conduct of their processes. The results also suggest that organizations' improved internal business processes forms the basis for improving their customer service. This aspect is important in today's business environment because organizations value adding capabilities is a major indicator of customer service improvement (Turban and Volonino, 2011). Sustainable IT-related capabilities' competitive advantage is contingent upon innovative ways of locking in the customers and increasing their switching costs. The final stage of the model suggests that organizations improved internal and external business processes will contribute to their firm-level performance.

Overall, this study presents a comprehensive approach of developing and evaluating the IT governance structures for collaborative alliances. The model permits making inferences on the effect of the IT governance structures on measures of business value. This understanding is important because stakeholders ultimately evaluate the financial ramifications of their decisions. This impact, however, is contingent upon organizations understanding and their ability to leverage the IT resources at the intermediate business processes level.

9. Contributions, directions for future research, limitations and conclusions

Prior research notes much on the potential of COSs, but understanding on the nature and effectiveness of their IT governance structures is relatively sparse. An important contribution of this research is the identification of the IT governance structures for the collaborative alliances, and a sustainable IT-related capabilities approach to assessing the effectiveness of these governance structures. The dynamic capabilities framework is an ideal basis for suggesting co-created governance structures and the need for organizations to possess sustainable IT-related capabilities. Understanding the relationship between these factors is an approach to evaluating the effectiveness of the IT governance structures for collaborative alliances. Future research can capitalize on these approaches to investigate new IT governance structures for COS. There is also potential for deepening our understanding on measuring the effectiveness of the IT

governance structures for COS. Future research can consider targeted measures of internal and external business processes, and firm-level outcomes.

For practice, this study demonstrates the need for inter-organizational coordination in governing the IT resources within COS. It offers possible forms of governance structures that involve different levels of management. The study suggests some sustainable IT-related capabilities that organizations may possess to leverage their IT resources. Importantly, it informs practice on understanding the relationship between the IT governance structures and sustainable IT-related capabilities as a basis for evaluating the effectiveness of the IT governance structures. There is also a need to link these sustainable IT-related capabilities to measures of business value. This linkage accords practice to make inferences on the business value implications of their IT management efforts. The result is a holistic approach to developing IT governance capacities, and ways to measure the effectiveness of these capacities.

A response rate of 15.90% is at the lower end of acceptable response rate. We, however, did manage to solicit responses from 118 contacts, and detailed diagnostics of the data did not reveal any issues on data quality and population representation. The data was also adequate to assess the structural properties of the suggested research model. This study uses a cross-sectional research design, which allows for assessment of important relationships between IT governance structures, sustainable IT-related capabilities, internal process-level performance, improvement in customer service, and firm-level performance in organizations that are part of COS. This approach does not address the question of causality. Despite the strong internal validity procedures in instrument development, testing, and administration, the sustainability of this study's findings is limited. A longitudinal study strengthens the causality and sustainability aspects of a research.

This study proposes four IT governance structures for collaborative alliances. Organizations size, experience level, and the representation of business units can also conceivably influence the effectiveness of these IT Governance structures. While other variables may capture the effect of these attributes, their exclusion may present some bias in the results. Future research can include these factors in this study's suggested model. We measure the effectiveness of the suggested IT governance structures for COS against the within-firm IT-related capabilities. It is possible that the suggested IT governance structures develop inter-firm IT-related capabilities, which then sustain alliances' within-firm IT-related capabilities. Future research could consider such inter-firm IT-related capabilities, and how they relate to within-firm IT-related capabilities. Our survey dataset allowed us to evaluate the total (higher level) effectiveness of the IT governance structures on the collaborative alliances' ability to sustain their IT-related capabilities. This means that this study does not evaluate the association between the individual IT governance structures and sustainable IT-related capabilities. Future research could consider this. While this study makes every conceivable effort in validating the research instrument, potential demand bias may exist in responding to measurement. Future research, perhaps by adopting alternative methodologies, could obtain information regarding size and composition of the IT structures, the times they meet during a given period, for a better understanding of the effectiveness of the suggested IT governance structures.

To conclude, this study offers insights on the need for co-created IT governance structures to manage the IT resources with COS. The proliferation of rich web 2.0 tools means organizations will increase their intensity of commitment into COS. This requires more effort in advancing this body of knowledge. Future research can add much to this knowledge by suggesting other IT governance structures, sustainable IT-related capabilities, and contingent factors to strengthen our understanding of the mechanics of effective IT governance for COS. We envisage our effort will encourage other researchers to add to this body of knowledge to ensure organizations are continually updated on ways to leverage their investment in the IT resources in a changing and turbulent business environment.

Acknowledgements

The authors thank Kevin Kobelsky and Jerry Gaertner for their valuable comments and suggestions, as discussants of an earlier version of this paper presented at the 7th biennial University of Waterloo symposium on information integrity and information systems assurance (held on October 20–21, 2011).

Appendix 1. Final Measurement Items

All items measured on a 7 point Likert scale (No basis for answering [0], Strongly Disagree [1], Disagree [2], Slightly Disagree [3], Neutral [4], Slightly Agree [5], Agree [6], Strongly Agree [7]).

Co-created IT steering committee

Our top management is part of an inter-organizational IT steering committee that makes IT-related resource allocation decisions relating to system development and recruitment, and training within our collaborative alliance.

Our top management is part of an inter-organizational IT steering committee that improves visibility of IT and revamps the IT practices within our collaborative alliance.

Our top management is part of an inter-organizational IT steering committee that helps facilitate the IT coordinating requirements and practices within our collaborative alliance.

Inter-organizational lateral communication systems

Our management continually communicate with their peers within our collaborative alliance.

Our management continually use the Web 2.0 tools to collaborate with partners in our collaborative alliance.

Our management continually communicate with their peers to strengthen partner relationship in our collaborative alliance.

Inter-organizational performance systems

Our organization uses broader metrics that consider factors outside our organization to evaluate our performance in relation to our collaborative alliance.

Our organization uses metrics that consider factors outside our organization to evaluate operational alignment in relation to our collaborative alliance.

Our organization uses metrics that consider factors outside our organization to evaluate operational consistency in relation to our collaborative alliance.

Co-created operational systems committee

Our operational and tactical managers are part of inter-organizational committee that makes decisions relating to alignment of processes.

Our operational and tactical managers are part of inter-organizational committee that discuss operational efficiencies of inter-organizational processes

Our operational and tactical managers are part of inter-organizational committee that set directions for process coordination between our collaborative alliances.

Sustainable top management commitment

Our top executives have clearly indicated their commitment to IT over the last five years.

Our top executives have championed IT within the organization over the last five years.

Our top executives have been at the forefront of IT adoption in our organization over the last five years

Sustainable shared organizational knowledge

Our IT management team is continually very well informed about the business operations and strategies of each unit.

Each unit's management team continually recognize IT as a competitive weapon.

Each unit's management team continually recognize IT as a tool to increase productivity of clerical and professional employees.

Sustainable flexible IT infrastructure

Our organization continues to refine and establish corporate rules and standards for hardware and operating systems to ensure platform compatibility over the last five years.

Our organization continues to have a high percentage of standardized corporate data and can access all data pertinent to a customer through a single interface.

Our organization continues to have a high percentage of corporate data that is currently sharable across systems and business units.

Customer service improvement

The customer service unit gives customers prompt service.

Customer service representatives are never too busy to respond to customers.

Customer service representatives are empowered to solve customers' problems.

Internal process-level performance

Our selling cost per employee has reduced significantly compared to our competitors.

Our labor cost has reduced significantly compared to our competitors.

Our operating expenditure has reduced significantly compared to our competitors.

Firm-level performance

Our return on investment has been outstanding compared to our competitors.

The increase in our total revenue has exceeded our leading competitors.

Our return on equity has been outstanding compared to our competitors.

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