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ABSTRACT

Aligning IT with business strategically is the recent area of attention among researchers and practitioners because of its potential impact on organizational performance. Currently, large numbers of enterprises are migrating towards cloud computing as on-premise implementation of Information technology (IT) infrastructure is expensive. The purpose of this research is to examine the factors that influence the alignment of IT and business in cloud computing environment. Therefore, this study used the Strategic Alignment Maturity (SAM) model as a framework to validate the evolution of IT-business alignment in a cloud computing platform. A questionnaire-based survey method was employed for data collection. The respondents are IT and business executives of adopter firms in India. The structural equation modeling technique is used to statistically validate the model. From the results, it is found that all the constructs contribute significantly to business alignment with cloud computing except partnering and skill maturity. This study contributes to the research related to the application of SAM model in investigating the alignment of cloud computing with business. Software vendors and information technology consultants can utilize this study in assisting a client in the alignment of business with IT strategically in a cloud computing environment.

Keywords: CCT-Business Alignment, Cloud Computing; SAM Framework; and Structural Equation Modeling

INTRODUCTION

The alignment of Information technology (IT) strategy with the organization's business strategy was an area of research since many past years (Rockert et al. 1996; Rogers, 1997). Business-IT alignment denotes the alignment of objectives and goals of an organization with IT strategies. It focuses on the application of Information Technology in synchronization with business strategies in an appropriate and timely way (Luftman, 1999). Business executives are still interested about how IT is aligned with the business and vice versa (Luftman et al., 2017). Previous studies showed that Business-IT alignment helps organizations maximize their return on investment in IT (Kashanchi and Toland, 2006; Avison et al., 2004). It supports the organization to know the true value of IT and improve its usage (Charoensuk et al., 2014). Byrd et al. (2006) suggested that BIA moderates the relationship between a firm's IT investment and organizational performance. Firms can improve their performance with the alignment of IT and business without spending much on IT infrastructure in cloud computing paradigm. Past researchers highlighted that scope of the business can be altered with IT infrastructure (Weill and Broadbent, 1998).

This study used Strategic Alignment Model (SAM) as this model suggests that IT-business alignment can be attained by building connections among four domains like IT strategy, business strategy, organizational business processes and IT infrastructure processes. This model can provide the organization with a roadmap that identifies opportunities for improving alignment of business and IT (Luftman, 1999). Luftman (1999) established a maturity assessment model, grounded on the six elements of alignment of business and IT that were proposed by Henderson and Venkatraman in 1997. The model comprises six alignment dimensions. Each dimension has numerous features and should be given attention for the alignment between business and IT. These dimensions are IT-Business communications, value analytics, IT governance, partnering, dynamic IT scope, and skills maturity.

The assessment method of Luftman (1999) provides organizations with a tool that gives an understanding of the alignment of Business and IT. It is very beneficial in identifying essential improvement areas, and also enables an open conversation between business executives and IT professionals. Luftman et al (2017) found that all the dimensions were significantly contributing to the business-IT alignment. They found that business-IT alignment has a considerable impact on the performance of an organization. Business-IT alignment is the linkage between IT and business at a strategic level by aligning organizational goals and objectives with the IT strategy.

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Earlier studies found that the alignment at the strategic level is more important than at the operation level (Chan, 2002). Hence, management realizes a greater return from a strategic level. SAM focuses on alignment between business and IT infrastructure and alignment between business infrastructure and IT strategy (Afandi, 2017).

Cloud computing technology (CCT) is being adopted by the firms as it provides IT infrastructure and enterprise applications over the network. The firms can reduce IT infrastructure costs by adopting the technology. Cloud adoption depends on the formulation of new IT strategy and its alignment with the business goals of an organization. Successful implementation of cloud computing depends on managing IT-related capabilities that leverage the business acumen and technical skills effectively to achieve organizational goals. Cloud computing modifies the means of using IT in the firm. The firm can utilize IT as a service from an external service provider instead of developing its own IT infrastructure on-premise. This novel way of IT consumption influences the alignment between the IT department and business units of the firm. Cloud infrastructure should be aligned with the long-term goals of the business to succeed in terms of optimal utilization of resources and fulfillment of IT strategy. This study used the SAM model as a framework to validate the evolution of CCT-business alignment. The objective of this study is to explore the factors that influence CCT-business alignment. An additional objective is to identify the impact of CCT-business alignment on firm's performance.

Cloud computing technology

Cloud computing is a parallel and distributed computing system consisting of a group of interconnected and virtualized computers that are vigorously provisioned and accessible as one or more integrated computing resources based on service-level agreements between the cloud provider and consumers (Buyya et al., 2009; Marston et., 2011). With CCT, software applications, software development tools, and IT infrastructure can be delivered on-demand to individuals and organizations through the Internet (Battleson et al.,2016). Firms can reduce cost, save time, and energy by adopting CCT as it allows businesses to access the current and updated software over the Internet (Raut et al., 2018). CCT is adopted by the firms as a novel IT innovation by aligning it into their corporate strategy (Li et al., 2012). CCT incorporates hardware, software, storage, server, network, etc. delivered over the Internet on demand regardless of time and location (Marston et al., 2011). Cloud computing has three service models such as Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). SaaS permits software applications to run freely on the cloud without any installation requirement on a client machine, for example, Google Doc, Salesforce.com, Gmail, Youtube, Flickr,

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Oracle CRM, etc; With the software development tools offered by PaaS, customers can develop and deploy applications such as Google Sites, Google 9 Analytics; and IaaS offers complete IT infrastructure such as hardware, software, server, storage and network on demand such as Amazon Web Services (AWS), Elastic Compute Cloud (EC2) and Simple Storage Service (S3) (Gupta et al., 2013; Priyadarshinee et al., 2017).

CCT also offers four types of deployment models - public, private, community, and hybrid cloud. In a public cloud, CCT solutions are freely accessible to all through the Internet. Customers are subscribed and use the cloud service on a pay-per-use basis, which means consumption-based billing is provided (Ramachandra et al., 2017; Marston et al, 2011). In a private cloud, for security reasons, cloud services are maintained within the premise of an organization with intranet functionality and billing is on a subscription basis (Ramachandra et al., 2017; Zissis and Lekkas, 2012; Marston et al, 2011). A community cloud is controlled by two or more firms having common interests or missions and sharing data and applications in the cloud (Ali et al, 2018; Marston et al, 2011). A hybrid cloud is a composition of a public and private cloud that enables data and application portability. Mateescu et al. (2011) stated that the hybrid cloud is the result of a merger between different cloud deployment models such as private, public, and community.

Cloud computing originates from other technologies, like, parallel and distributed systems, grid computing, virtualization, multi-core chips, and Internet (Buyya et al., 2009). Cloud computing has five distinct features that are on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service (Senyo et al., 2018). The first feature, on-demand self-service means that computing resources are delivered to the customer's on-demand without human intervention. Ubiquitous network access means accessibility of computing resources independent of device and location. Third, resource pooling means allowing multiple customers to share computing resources from a single pool of servers or disk storage. Fourth, elasticity means the provision of computing resources can scale up and down with demand. Fifth, measured service means charging customers as per usage within a specific period (Senyo et al. (2018).

An international study on “Influential IT Management trends” conducted by Luftamn et al. (2015) in which, CCT was highlighted as the most leading technology over a period of ten years. CCT transforms enterprise systems and provides business agility, flexibility, and productivity to the firms (Ooi et al., 2018). CCT also transforms the traditional manufacturing business model by encouraging effective collaboration, and by aligning product innovation with business strategy.

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This gives rise to the concept of "cloud manufacturing" (Lu et al., (2014); Ooi et al., 2018). The advantage of CCT over traditional computing are scalable, ubiquity, cost reduction, and business agility. Despite the many benefits of CCT, organizations are more concerned about the issues related to the technology such as data leakage, security and privacy of data, data quality and assurance, and data stewardship (Al-Ruithe et al. 2017; Priyadarshinee et al., 2017). Hence, there is a need to understand the process of alignment of CCT with a business strategy in order to increase the performance of the organization.

Business Strategy and IT strategy will be aligned when businesses and IT departments collaborate to achieve common goals (Alaceva and Rusu 2015). Milian et al. (2015) identified CCT adoption as a tool to promote the strategic alignment of IT with business. CCT can open new market opportunities for the firms (Milian et al., 2015). For this purpose, the Strategic Alignment Maturity (SAM) model is used to examine the factors of CCT-Business alignment. This study employed six dimensions, including communication maturity, the value of CCT, Partnering, CCT Governance, IT infrastructure, and Business and CCT skill maturity to investigate CCT-business alignment.

Successful adoption of cloud computing requires a sound IT strategy.
One of the essential foundations of forming such a strategy is to align IT objectives to business goals. Recently, alignment of cloud computing and business become priority for business leaders and IT professionals hence, this study is motivated to explore the factors that have an impact on the alignment of cloud computing and business.

THEORETICAL REVIEW

The alignment of IT with business can improve financial performance and competitive advantage for a firm. SAM is used to determine the scope and level of activities through which the IT and business functions involve assessing the value-added activities of the firm. A value-added activity is a business activity that develops a product or service at a price that the customer is ready to pay. Luftman (1999) highlighted six criteria that a firm can use to measure the level of alignment between IT and business. Each criterion has further a set of diverse activities. The first criteria of the SAM model are communication which refers to the strength and value of the interchange of knowledge, thoughts, and information between IT and business organizations. This helps both IT and organizations to understand the strategies, plans, risks, priorities, business, and IT infrastructures. Business and IT alignment require an effective exchange of ideas and a clear understanding of business and IT strategies (Luftman, 2006).

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Knowledge sharing between the business leaders and IT department is important that helps to improve the relationship between IT and the business people. Communications are attained through meetings joined by the senior and middle-level managers and can discuss business requirements, urgencies, and IT implementation. The second criterion is value analytics, which refers to the creation of shared and consistent measures of performance to demonstrate the role of IT and organizations to the business in such a way that both IT and business realize and accept. A dashboard that shows the value of IT in terms of its role and contribution to the business is required. Service level agreements that evaluate obligations of IT to the business help in understanding the role of IT in the business (Luftman, 2006). Adding more business-related metrics to SLAs can help in improving the maturity of value analytics which, in turn, helps in developing a partnership between IT and the business units. It is important to conduct periodic formal assessments and reviews for continuous improvement. IT governance is the third criterion, which refers to formal processes used by IT and business managers for making IT decisions, setting IT priorities, allocating resources, and controlling activities at strategic, tactical, and operational levels. The business priorities and IT resources allocations are formally discussed and reviewed among the business and IT participants. This policy-making authority should be clearly defined among the members of the organization (Luftman, 2006). Developing a unified enterprise-wide strategic business plan for IT would enable better partnering within the firm and would become a base for outward partnerships with customers and suppliers. Fourth is partnering which refers to the level of relationship between IT and business functions, the level of trust, and how each identifies the other's involvement. The affiliation that exists between the business and IT organizations is another criterion that positions high among the enablers of business-IT alignment. IT function should get an equal opportunity to design business strategies for the organization like other business functions. The trust that develops among IT and business functions, understanding each of their contributions to the business goals, sharing risks and rewards are all major contributions to mature the alignment between business and IT (Luftman, 2006). Fifth is dynamic IT scoping, which refers to the activities related to flexible IT infrastructure, application, and evaluation of current and promising technologies. This includes the activities that drive business process change and deliver customized solutions to business units, customers, and partners. Maturity of information technology takes place when infrastructure is flexible and transparent to all business partners and customers. The IT infrastructure is composed of all emerging technologies that have been implemented and adopted by the firm effectively. Infrastructure is capable of providing customized solutions to the customers (Luftman, 2006).

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Business and IT skills maturity is the sixth criterion, which refers to all human resources (HR) activities such as retention, training, hiring, performance feedback, innovation encouragement, career opportunities and, skills development of an individual. It also measures the IT organization's readiness for change, learning, and ability to pull new ideas. It includes organization readiness for change in the dynamic environment and employees have a sense of responsibility for business innovation. Business and IT skills maturity depend on how quickly the organization and employees learn from their experience and how the organization promotes innovative ideas and the entrepreneurship spirit.

HYPOTHESES DEVELOPMENT

The first dimension of the SAM model is communications, which represent the interchange of knowledge, information, and ideas between business and IT to fulfill the objectives of an organization. According to Luftman (1999), effective communication leads to the trusting relationship between IT and business executives and facilitates the collaborative usage of resources at the optimum level. This makes the organization more nimble, responsible, and risk-taking. Reich and Benbasat (2000) stated that shared knowledge of IT and business and communication between IT and business managers positively influence alignment. Gutierrez et al. (2009) found that communication has a positive impact on knowledge sharing in an organization which in turn, influences business-IT alignment. A shift to cloud computing will be most operative when rewards and returns related to the business are, equally, and regularly communicated to top executives, business leaders, and end-users. Senarathna et al. (2018) suggested that awareness to the benefits and risks of cloud computing adoption can affect its alignment to the business. Therefore, it is posited that communication maturity has a positive impact on CCT-business alignment.

H1a: Communication maturity has a positive impact on CCT-Business Alignment

Value analytics refers to the potential use of key performance measures of a business to determine the value of IT in terms of its contribution to the business (Luftman et al., 2017). This requires the collaboration of IT and business managers on an assessment of the project portfolio of a firm. The success of an organization relies on the alignment of IT and business strategies by establishing priorities for IT projects and efficiently distributing resources (Ittner et al., 2003). Luftman et al. (2017) also highlighted that the value of business projects will come from the contribution of IT to the business. Benefits of cloud computing adoption can be realized through improved efficiency, rationalized system upgrades, reduced time

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for system deployment and configuration, flexibility, and control on utilization of IT resources (Payne, 2013). Senarathna et al. (2018) suggested that the value of cloud computing is influenced by its relative advantages such as increasing profits, reducing costs, and creating opportunities for the business. Given these discussions, it is hypothesized that value analytics have a positive impact on CCT-business alignment.

H1b: Value analytics have a positive impact on CCT-Business Alignment.

IT Governance refers to how well a firm connects its business strategy to IT priorities, technical planning, and budgeting. Governance related activities include steering committees, IT-business liaisons, resource allocation, and budgeting. These activities help in making informed IT investment decisions by defining the role of IT in achieving business vision and strategies. Hence, IT governance can play the most influential role in achieving alignment of IT to the business.
Blahunka (2011) highlighted the need for appropriate and effective IT governance in a cloud computing platform for its alignment with the business. Suicimezov and Georgescu (2014) also highlighted the importance of IT governance in cloud computing at the business level. Cloud governance is related to the decision-making process, policies needed to plan, deploy, create, and manage cloud computing capability, and selection of cloud service providers (Sehgal et al., 2011). CCT offers not only opportunities for the firms, but also risks like Information security threats. Thus, IT governance must be applied to the cloud to manage the risks related to cloud computing information security (Faizi and Rahman, 2019). Given the above discussions, it is hypothesized that IT governance has a positive impact on CCT-business alignment.

H1c: IT governance has a positive impact on CCT-Business Alignment.

Partnering refers to the degree to which the business and IT department establish a relationship based on mutual trust and sharing of risks and rewards. It helps to achieve alignment with cross-functional teams. Organizations that considered IT as their integral part and implement compensation and reward systems, influence IT managers to take risks (Johnston and Carrico, 1988). The enduring partnership between business and IT departments prolongs when partners recognize mutual benefits, share obligation to the partnership through common objectives and incentive systems, and reveal belief and positive approach toward the potential contributions of each other (Henderson, 1990). This long-term partnership encourages the mature alignment between IT and business strategies. Tung (2016) highlighted that the IT department and business leaders have to partner to understand how to work productively under the cloud-delivered service model

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within the perspective of their business. This begins with finding out why a business unit wants to use CCT and placing the right expectations. In a cloud computing environment, IT must perform as a true partner to the business, not like a backend function that just distributes technology services. Hence, it is hypothesized that partnering has a positive impact on CCT-business alignment.

H1d: Partnering has a positive impact on CCT-Business Alignment.

Dynamic IT scope is the extent to which the technology has evolved to help the business to grow, compete, and profitable. It is one of the most mature alignment facilitators of a firm in its global integration initiatives. It includes the use of integrated standards for hardware and software solutions, a flexible infrastructure that is transparent to all business partners and customers, evaluates and apply emerging technologies effectively, enable or drive business processes and strategies as a true standard, and provide solutions customizable to customer needs. According to Foster (1986) and Keen (1991), dynamic IT scoping is required as IT infrastructure needs to be re-scoped with the change in the scope of the business. Organizations can reduce their IT capital expenditures, as well as operating and maintenance costs with the help of cloud computing and focus toward their core business activities. Hence, organizations integrate cloud computing into their IT-related strategy to achieve competitive advantage (Garrison et al., 2015). Based on these discussions, it is hypothesized that dynamic IT scope has a positive impact on CCT-business alignment.

H1e: Dynamic IT scope has a positive impact on CCT-Business Alignment.

Skills maturity refers to how well IT staff can understand business processes and express the business language. It also refers to how well the corporate staff can understand the major concepts of the technology. It can measure the organizational learning capability and ability to implement and utilize innovation to the optimum level. According to Snell and Bohlander (2007), balanced and higher-quality human resources promote IT and business alignment. Technical capabilities of business leaders in a cloud computing paradigm could result in improved cycle times and modernized business processes differentiating the organization from its rivals (Garrison et al., 2015). IT managers with strong technical and business skills help organizations to integrate cloud solutions with their business strategy. Skilled IT managers would utilize the benefits of cloud computing across business units to improve overall firm performance by reducing IT-related expenditures and improving IT economies of scale. (Garrison et al., 2015). Ross and Blumenstein (2013) also highlighted that the business model of cloud computing lies at the nexus of information and communication technologies (ICT) and business strategies.

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Business responsiveness within IT is done by specific IT business analysts, who recognize and interpret the business needs of other IT department staff (Luftman, 2006). Business executives must have business acumen and understand the language of the C-suite and IT. These business and IT skills of the project leader help in the alignment of cloud-business strategy. Therefore, organizations require managers with a combination of technical and business acumen. Hence, it is hypothesized that skills maturity has a positive impact on CCT-business alignment.

H1f: Skills maturity has a positive impact on CCT-Business Alignment.

Firm performance can be reflected through financial performance, which is a measure of how efficiently a firm uses its resources to produce profits. Porter (1985) highlighted that strategically aligned IT investments positively influence a firm's key performance indicators. Sabherwal and Kirs (1994) examined the alignment between organizations' IT capabilities and their success factors and reported the positive influence of alignment on a firm's performance. According to Powell and Dent-Micallef (1997), organizational performance depends on the integration of technology with organizational, technical, and organizational resources. Likewise, Sabherwal and Chan (2001) examined the influence of IT-business alignment on perceived business performance and found the positive effects of strategic alignment on the performance of the firm. Cragg et al. (2002) also reported that firms perform better with high levels of alignment rather than with low levels of alignment. Likewise, Chan et al. (2006) confirmed the positive relationship between alignment and the success of the firm. Garrison et al. (2015) found that alignment of IT-based capabilities (managerial, technical, and relational) with cloud delivery models positively affects firm performance. Kathuria et al. (2018) also reported that cloud computing alignment with business processes leads to firm performance. Based on the above discussions and findings, it is hypothesized that CCT-business alignment has a positive impact on firm performance.

H2: CCT-business alignment has a positive impact on firm performance.

Control Variables

This study considered the firm size and industry type as control variables in examining the firm performance through the alignment of CCT with business.

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Firm Size and CCT-business alignment

The adoption of cloud computing leads to the alignment of the strategic use of IT with firms' business competence (Son et al., 2014). The size of the firm reflects the complexity of an organization. Lee and Xia (2006) highlighted the importance of firm size in evaluating the value of IT to the business. CCT allows small firms to set up new IT infrastructure with a low IT budget, and hence such firms can achieve more business values from CCT compared with large firms (Plummer, 2008; Son et al., 2014). Therefore, firm size is considered as a control variable in determining CCT-business alignment.

Industry Type and CCT-business alignment

CCT is a multidisciplinary research field that motivates both business-oriented evolution and technological-oriented advancement (Xu, 2012). Hence, CCT adoption can influence both IT infrastructure and business infrastructure, mainly in improving IT efficiency and business agility. The services sector is more data-intensive than the manufacturing sector, hence service firms are more interested cloud adoption than manufacturing firms (Haug et al., 2016).

Joe Palian (2018) highlighted that adoption of cloud computing varies from industry to industry, mainly because of the disparate security and IT capability levels. Luo et al. (2012) examined industry type as a control variable to recognize the differences in performance related to industry-specific characteristics like industry environment and intensity of market competition. Financial services and retail are the most cloud adaptive service sectors, while healthcare, education, and social services, are the least likely to be cloud adaptive firms. Therefore, business and financial services are very data-intensive sectors and require real-time data transfer. Son et al. (2014) also included the industrial sector as a control variable to check industry-specific effects on market reactions to cloud computing initiatives. They found that firms in the service industry attain comparatively higher payback from cloud computing services than those in non-service industries. Son et al., 2014 stated that managers, who are planning to adopt cloud computing in their firms, should consider the industry type to control the success of IT investments. Hence, the industry type is considered as a control variable in this study.

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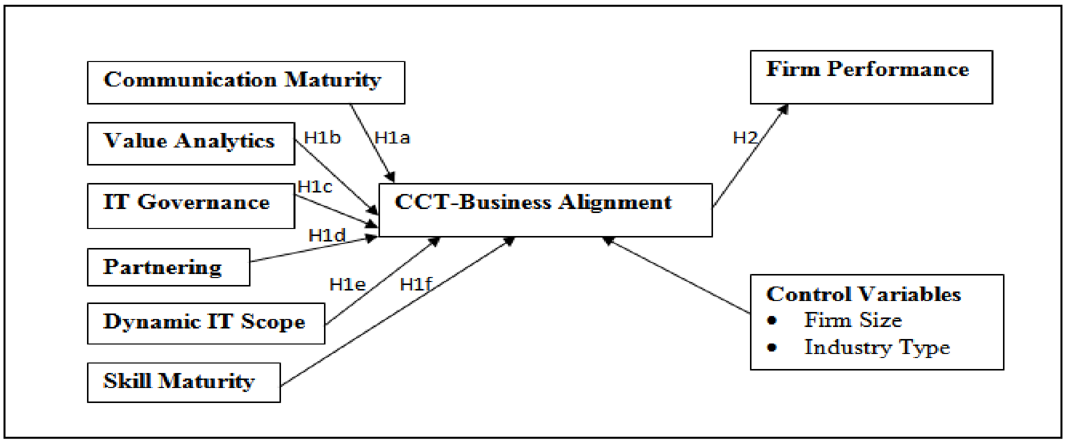
RESEARCH MODEL

The study developed a research model, which consists of the formative construct of CCT-Business Alignment with six SAM dimensions namely communication maturity, value analytics, IT governance, partnering, dynamic IT scope, and skill maturity. These six constructs are independent variables, whereas CCT-business alignment and firm performance are taken as dependent variables. The model shows that the formative construct of CCT-Business Alignment has an impact on the firm's performance. The variables, firm size, and industry type act as control variables. The model is illustrated in Figure 1.

Figure 1. Research Model



RESEARCH METHODOLOGY

The questionnaire-based survey method is used for data collection and the survey instrument includes 45 items. The construct 'firm performance' has five items, as adopted from the scale of Gerow et al. (2014). The six items of the construct, 'CCT-Business alignment' is adopted from Gerow et al. (2014). The other 34 items related to the constructs of communication maturity, value analytics, partnering, IT governance, dynamic IT scope and skill maturity have been adopted from the scale proposed and tested by Luftman et al. (2017). Since the questionnaire consists of 45 items, at least 450 responses are required to test the hypotheses by maintaining a 1:10 ratio between an item and respondents (Hair et al., 2010). The measurement scales of the respective constructs are shown in Appendix A.

Cloud initiatives require a unified front that combines executive leaders, business managers, and IT professionals (Rick and Dailey, 2017). Hence in this study, the respondents are IT professionals and business executives of cloud computing adopter firms and are key decision-makers. The data used in this study are obtained from the NIIR (National Institute of Industrial Research) database of a project consultancy firm. The database includes around 2500 cloud computing adopter firms in India. Louis Columbus (2018) also highlighted that manufacturing, high-tech, and telecommunications/utilities are the three industries that are adopting cloud computing due to high pressure from executive management. Data are collected from the metro cities of India, mainly Hyderabad, Bangalore, and Mumbai because these cities have established IT-hubs. Simple random sampling was performed to select the sample from the sampling frame. A pre-test involving 10 IT professionals was conducted to validate the questionnaire for its clarity of the questions. Four questions were removed in this stage due to the issue of non-suitability. The final questionnaire consists of a total of 41 items.

The questionnaire was administered through email to the IT professionals and business executives of the firms. Before sending emails, their experience and duration of using cloud computing in the firm were thoroughly checked. Respondents are asked to rate their organization's activities against each of the instrument's 41 items using a 5-point Likert scale. The total duration of the data collection was 6 months. Non-response bias was taken care of by sending reminders to respondents. Respondents are aware of the confidentiality of the information provided by them. The total number of responses received was 560. Since 22 responses were incomplete, they were removed and the final sample size came down to 538.

RESULTS

Preliminary Analysis

The final number of respondents was 538 after discarding the incomplete questionnaire. The response rate was 53.8%. Table 1 shows the descriptive statistics of the sample.

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Table 1. Descriptive Statistics of the Sample

Characteristics		**Frequency**	**Percentage**
Firm	Small-sized	142	26.3%
	Medium-sized	52	9.66%
	Large-sized	344	63.9%
Industry	High-Tech	278	51.6%
	Services	145	26.9%
	Telecommunications	32	5.94%
	Manufacturing	45	8.36%
	Others	38	7.06%
Designation	IT Managers	288	53.5%
	Senior Managers	203	37.7%
	Others	47	8.73%
Gender	Male	464	86.2%
	Female	74	13.75%
	Average Years		
Age	38.5		
Experience	7		

The majority of the firms belong to the high-tech industry followed by the service sector and by telecommunication, manufacturing, and other sectors. The sample was dominated by large firms belonging to IT and service industries. The majority of the respondents are male, holding a designation of IT managers and senior managers. The respondent's average age is 38.5 years and the average work experience is 7 years.

Exploratory factor analysis was performed on the independent and dependent variables to measure their unidimensionality. Cross loading issue was found in the three items of the construct CCT-business alignment, hence removed. Hence total items come down from 41 to 38. The determinant of the R-matrix was 0.0000110 which is above the cut-off value of 0.00001 (Field, 2009). The Bartlett test of sphericity is found as significant ($p<0.001$), and the Kaiser-Meyer-Olkin value is 0.868, which shows that factor analysis fits the data. These results indicate considerable positive signs to perform factor analysis on the collected data.

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The normality and reliability of the constructs were checked through skewness, kurtosis, and Cronbach's alpha values. All the items show skewness values between +2 and -2, kurtosis values between +7 and -7, which are acceptable (Curran et al., 1996; Fabrigar et al., 1999). Cronbach's alpha values of all the constructs are above 0.7, which is acceptable (Cronbach & Shavelson, 2004). Table 2 provides all the results, which have no issues of normality and reliability.

Table 2. Construct Reliability and Normality

Constructs	Cronbach's alpha	Mean	Standard Deviation	Skewness	Kurtosis
Communication Maturity (CM)	0.944	3.19	1.36	0.035	-1.273
Value Analytics (VA)	0.922	2.99	1.19	0.052	-0.970
IT Governance (ITG)	0.945	3.402	1.247	-0.233	-1.015
Partnering (PA)	0.892	3.376	1.164	-0.256	-0.789
Dynamic IT Scope (INF)	0.945	3.561	1.266	-0.471	-0.880
Skill Maturity (SM)	0.892	3.833	1.174	-0.888	-0.043
CCT-Business Alignment (CCBA)	0.847	2.883	1.313	0.107	-1.182
Firm Performance (FP)	0.941	3.948	1.187	-0.890	-0.277

Common method bias (CMB) was checked with the help of Harman's single-factor test, in which all items are loaded into one common factor. The total variance for a single factor must be less than 50% to prove CMB does not affect the data (Podsakoff et al., 2012). The total variance of a single factor is found as 28.26 % which is less than 50%. Hence CMB is not an issue in the study. CMB was also checked using a common latent factor (CLF) test during confirmatory factor analysis (CFA).

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The multi-collinearity analysis was conducted between items to demonstrate the unique role of each of the six factors. It can also be checked with the help of tolerance and it's reciprocal, called the variance inflation factor (VIF). Multi-collinearity exists, if the value of tolerance is less than 0.2 and, the value of VIF is 10 and above (Hair et al., 2010). The results of tolerance and VIF are shown in Table 3. All the values of tolerance are above 0.2 and VIF values are below 10, and hence multi-collinearity is not an issue.

Table 3. Construct tolerance and VIF

Constructs	**Tolerance**	**VIF**
Communication Maturity (CM)	0.797	1.255
Value Analytics (VA)	0.619	1.616
IT Governance (ITG)	0.623	1.606
Partnering (PA)	0.799	1.251
Dynamic IT Scope (INF)	0.66	1.515
Skill Maturity (SM)	0.815	1.227

Confirmatory Factor analysis Results

According to Hair et al. (2019), Structural equation modeling (SEM) must use when the analysis is based on testing a theoretical framework from a prediction viewpoint and structural model is complex and comprises many constructs, indicators and model relationships, path model contains one or more measured constructs and the sample size is sufficiently large for data analysis. Given the above condition, this study used SEM for analyzing data.

SEM is applied in two ways – confirmatory factor analysis (CFA) of the measurement model and path analysis of the structural model. The present study used CFA to validate the initial conceptual model and also explain the relationships between constructs. CFA indicates how the items are grouped to represent constructs and are generally used for validating the measurement model by examining convergent validity, and discriminant validity of the construct (Hair et al., 2010; Byrne, 2013). The model fit indices are also evaluated with CFA.

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The average variance extracted (AVE) was used to measure the discriminant and convergent validity of the constructs. All the constructs have AVE values above 0.5 as recommended by Hair et al. (2010). For discriminant validity, AVE values of all the constructs should exceed the square of all the inter-construct correlations (Fornell and Larckers, 1981; Chin and Frye, 1996). AVE values of all constructs exceed the correlations between the constructs and hence, discriminant validity of the measurement model is established. Table 4 and 5 provides the result of the analysis indicating that there are no issues related to convergent and discriminant validity.

Table 4. Convergent Validity Test

Constructs	Items	Loadings	Composite Reliability	Average Variance Extracted
CM	CM1	0.874		
	CM2	0.819		
	CM3	0.856		
	CM4	0.831		
	CM5	0.886		
	CM6	0.896	0.71	0.74
VA	VA2	0.706		
	VA3	0.698		
	VA5	0.943		
	VA6	0.888		
	VA7	0.951	0.80	0.71
ITG	ITG1	0.72		
	ITG2	0.993		
	ITG3	0.751		
	ITG4	0.72		
	ITG5	0.993	0.69	0.71
INF	INF1	0.794		
	INF2	0.914		
	INF3	0.904		
	INF4	0.844		
	INF5	0.748		
	INF6	0.778	0.65	0.69
PA	PA1	0.824		
	PA2	0.904	0.7	0.73

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	PA3	0.847		
	SM1	0.757		
SM	SM2	0.778		
	SM3	0.754	0.53	0.58
	CCBA1	0.756		
CCBA	CCBA2	0.841		
	CCBA3	0.819	0.66	0.65
	FP1	0.818		
	FP2	0.91		
FP	FP3	0.896		
	FP4	0.897		
	FP5	0.838	0.75	0.76

Table 5. Discriminant Validity Test

Constructs	CM	VA	ITG	INF	PA	SM	CCBA	FP
CM	**0.74**							
VA	0.18	**0.71**						
ITG	0.18	0.05	**0.715**					
INF	0.02	0.06	0.12	**0.69**				
PA	0.24	0.02	0.26	0.13	**0.74**			
SM	0.13	0.05	0.15	0.06	0.21	**0.58**		
CCBA	0.09	0.03	0.07	0.04	0.06	0.05	**0.65**	
FP	0.17	0.02	0.08	0.59	0.21	0.09	0.08	**0.76**

The goodness of fit of a model was examined using the chi-square ($\chi2$/df) test. The $\chi2$ /df value is found 4.54 at $p < 0.001$ which is less than 5, as recommended by Wheaton et al. (1977). Previous researchers (Hu and Bentler, 1999; Ho, 2006; Schumacker and Lomax 2010) highlighted those incremental fit indices of CFI, NFI, TLI and IFI must have a value close to 0.90 or above for acceptable model fit. The derived values of NFI, CFI, TLI, and IFI in this study are 0.881, 0.904, 0.891, and 0.904 respectively. All these values are close to 0.90 with a CFI and IFI equal to 0.904. RMSEA value is derived as 0.081, which must be <=0.08 as recommended by Byrne (2001). In view of these derived results, it is found that goodness of model fit is established.

Common latent factor Test (CLF) was also performed to check the possibility of common variance in the model. CLF Test was conducted by comparing the standardized regression weights with and without the common latent factor.
The standardized weights without CLF are expected to be higher than standardized weights with CLF, hence standardized estimates with CLF are subtracted from the standardized weights without CLF. Difference between the standardized estimates with CLF and without CLF for all the variables was found less than 0.05, hence, the chance of availability of common method bias was rejected (Gaskin, 2012).

Results of Path Analysis

AMOS 20 software application was used to test the structural model. The model was tested twice, first without control variables and the second time with control variables. This results in two different structural models with different regression weights and p-values. For both first and second structural models, four hypotheses H1a, H1b, H1c, H1e are statistically coming significant at p value<0.001, except hypotheses H1d and H1f. This indicates that the causal impact of the four dimensions of communication maturity, value analytics, dynamic IT scope, IT governance on CCT-business alignment is confirmed. Hypothesis H2 is also found significant, which indicated the influence of CCT-business alignment on firm performance.

The derived regression weights along with their significance are shown in Table 6 and Table 7 without and with the inclusion of control variables. For the first structural model, the R^2 value of the construct 'CCT-business alignment' for the first structural model is derived as 0.82. This indicates that the six factors, namely, communication maturity, value analytics, IT governance, partnering, dynamic IT scope, and skill maturity explain 82% of the variance of 'CCT-business alignment'. For the second structural model (with the inclusion of control variables), square multiple correlation (R^2) value of the construct 'CCT-business alignment' increased from 0.82 to 0.93. This means that the control variables 'firm size' and 'industry type' have an impact on the dependent variable 'CCT-business alignment'. According to Sarstedt, M., & Mooi, E. (2014), it is hard to identify the appropriateness of R^2 value, as this depends on the research area. For instance, higher R^2 value is common in longitudinal studies. R^2 values of around 0.30 are common in cross-sectional designs. Adding one more variable to the model cannot increase or decrease the total variance. The regression model has the option to ignore the added variable and regress the last variables of the model. The influence of control variables can only be seen by increasing R^2 value and by explaining more variance in the model.

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Hence, adding a new variable can only improve the R^2 value.
The result showed that the control variable 'Firm size' does not have any influence on CCT-business alignment, whereas ‘industry type’ influences CCT-business alignment. This indicates that all the firms whether they are small, medium, or large, are aligning cloud computing with the business for different purposes and to achieve different benefits. This finding goes well with the findings of Gutierrez et al. (2009) that small, medium and large organizations observed alignment similarly, though, there are significant differences in the way these organizations implement their strategies related to business alignment.

Another control variable, 'Industry type' showed a significant influence on CCT-business alignment. This finding goes well with the results of previous researchers (Low et al., 2011; Alismaili et al., 2016), that different industry sectors align cloud computing at a different rate to their business. Hsu and Lin (2016) also highlighted that industry type is found as a significant control variable affecting the level of cloud computing adoption. As per their findings, manufacturing firms were more likely to adopt cloud computing than finance and service firms. Hence factors affecting the adoption of cloud computing differ across different industries (Oliveira et al., 2014).

Table 6. Regression weights and P-values (Without Control Variables)

Path			**Estimate**	**S.E.**	**C.R.**	**P- value**
CCBA	<---	CM	-0.085	0.017	-5.121	***
CCBA	<---	VA	-0.043	0.011	-3.975	***
CCBA	<---	ITG	-0.032	0.013	-2.519	0.012
CCBA	<---	PA	-0.005	0.012	-0.381	0.703
CCBA	<---	INF	-0.213	0.037	-5.71	***
CCBA	<---	SM	0	0.013	0	1.000
FP	<---	CCBA	-2.999	0.508	-5.902	***

**** P-value denotes item loadings are highly significant at 0.1% (or 0.001) level.*

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Table 7. Regression weights and P-values (With Control Variables 'Firm Size' and 'Industry Type')

Path			Estimate	S.E.	C.R.	P - value
CCBA	<---	CM	-0.087	0.016	-5.298	***
CCBA	<---	VA	-0.047	0.011	-4.204	***
CCBA	<---	ITG	-0.032	0.013	-2.389	0.017
CCBA	<---	PA	-0.006	0.013	-0.423	0.672
CCBA	<---	INF	-0.226	0.037	-6.065	***
CCBA	<---	SM	-0.001	0.014	-0.056	0.955
CCBA	<---	SIZE	0.011	0.01	1.065	0.287
CCBA	<---	TYPE	-0.031	0.012	-2.505	0.012
FP	<---	CCBA	-2.815	0.45	-6.259	***

**** P-value denotes item loadings are highly significant at 0.1% (or 0.001) level.*

DISCUSSION AND CONCLUSION

The positive relationship found between communication maturity and CCT-business alignment suggests clear communication between cloud service providers (IT organizations) and business organizations. Pricing strategies and service level agreements (SLAs) of cloud providers should be understandable and attractive to the business organization (Marston et al., 2011). In SLA, cloud providers should mention that they are also responsible for backup, fail-over, data integrity, and data security (Truong, 2010). Clear communication between cloud vendors and the organization develops a trusting relationship between them. This contributes to the perception of the IT manager that the vendor is responsible, consistent, even-handed, and working for the best benefits of their organization (Garrison et al., 2015).

The significant relationship between value analytics and CCT-business alignment suggests that cloud computing offers the promised benefits to the firms. The benefits realized through CCT-business alignment are reduction of computing costs, flexibility, ease of IT infrastructure installation and maintenance, and data analysis (Hsu et al., 2014). Cloud providers manage the installation, maintenance, and upgrade routines of the system, which reduces the IT-related costs of the organization.

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The elastic and scalable nature of cloud computing increases organizational agility in response to market demand. In addition, CCT enables the firms to utilize on-demand software applications and in this way, firms sustain their technological agility as well (Son et al., 2014). The valuable contribution of CCT to the business is confirmed with the benefits experienced by the firm after its adoption.

The result of the study showed that IT governance has a positive significant relationship with CCT-business alignment. This finding coincides with earlier studies (Maches, 2010; Blahunka, 2011; Suicimezov and Georgescu, 2014) that effective governance is a key to maximize the value an organization receives from the investment in cloud computing. This finding also concurs with Faizi and Rahman (2019) that IT governance should be applied to cloud computing to manage the risks associated with it. The significant relationship between 'Dynamic IT scope' and 'CCT-business alignment' suggests that cloud computing provides flexible infrastructure and on-demand applications to the firm. Cloud enables firms to flexibly deploy IT resources independent of time and location (Liu et al., 2016). With the help of cloud service models of IaaS and PaaS, the IT system becomes more elastic and scalable, and hence, the cloud increase business agility by making IT systems more flexible (Fuzes, 2018). Senarathna et al. (2018) also highlighted that cloud computing creates a flexible business environment with dynamic scaling and accessibility. The results also showed that CCT-business alignment has a positive and significant impact on firm performance. This finding goes well with Kathuria et al. (2018) and Garrison et al. (2015) that cloud computing alignment with business processes leads to firm performance. Loukis et al. (2019) emphasized that operational and innovational benefits derived by the cloud-based delivery model enhance firm performance.

In the case of both structural models (with and without control variables) the construct 'partnering' comes out insignificant in influencing CCT-business alignment. This finding coincides with Ross and Blumenstein (2013) that senior managers consider the IT department as the cost center of the organization without understanding its potential strategic role. In order to achieve the full potential of a cloud-based business model, the attitude of senior managers needs to change (Ross and Blumenstein, 2013). Fuzes (2018) also highlighted those managers directly order cloud services (SaaS, PaaS, and IaaS) from providers without involving the IT department in purchase decisions, and such practice may have a negative impact on the operations of the firm. Butterfield et al. (2016) and Alaeddini et al. (2017) highlighted that the adoption of cloud computing changes the role of the IT department in such a way that it loses control over the firm's IT systems. Therefore, the IT department needs to integrate different on-premise systems and cloud services in order to improve alignment between business and IT (Fuzes, 2018).

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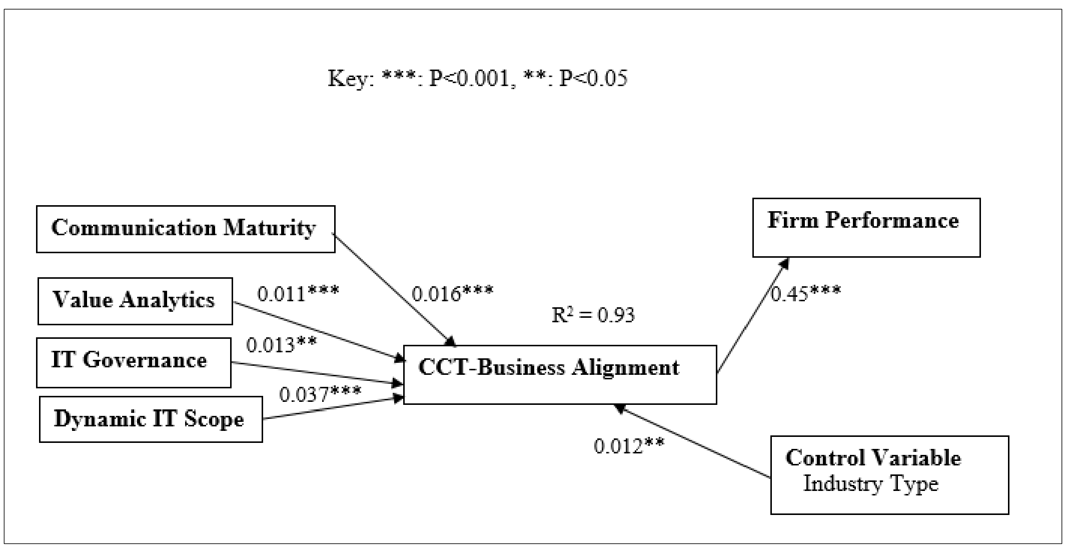
In the case of both structural models, the construct, 'skill maturity' is found insignificant in influencing CCT-business alignment. These findings go well with Lin and Chen (2012) and Oredo and Njihia (2014) that IT professionals with updated skills are required for the alignment of cloud computing with the business. This is because technology always progresses faster than the business's capability to adapt and use it in innovative ways. Calhoun (2016) also highlighted that manager require new skills and mindsets to make cloud service-related purchase decisions. The finding coincides with Ross and Blumenstein (2013) that technical skills are not enough for CIO or senior ICT managers to fulfill their role in cloud computing business models. Business users require new skills to link and integrate different on-premise and cloud services (Calhoun, 2016). In the case of the cloud computing job of IT managers shifts to the cloud supply chain management role, and therefore roles and skillsets of IT managers need to change (Ross and Blumenstein, 2013).

hence, the research model was revised as per results obtained. Figure 2 shows the revised model with 93% of the variance in CCT business alignment.

Figure 2. Revised model showing standard estimates and p-values of the factors



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CONTRIBUTIONS AND IMPLICATIONS FOR RESEARCH AND PRACTICE

This study will help in understanding the contribution of IT to the business in a cloud computing environment. Academicians can further utilize this research to explore additional activity-based constructs on CCT-business alignment. The results of this study will help the executives to articulate broad action plans for achieving greater CCT-business alignment and this enhances the effect of cloud computing on the business. This research proposed SAM model as a tool to use IT-Business alignment in a cloud computing paradigm effectively. This study provides an idea to business leaders and IT professionals that how they can improve business-IT alignment in a cloud computing paradigm.

With this study, it can be concluded that cloud computing modifies the role of the IT department. A portion of the tasks is relocated to the cloud provider from the IT department of the organization. This influences the role and responsibilities of the organization's IT department and also impacts the business-IT alignment (Fuzes, 2018). Alignment of business and cloud computing involves a strategic and well-versed evaluation of present and future business goals with an understanding of how the cloud can fulfill and support them. This needs support from C-suite executives and business leaders to confirm the adaptation of cloud computing by the employees of the firms.

Cloud initiatives require an evaluation of gaps in present business capabilities and how the cloud can aid organizations to solve these issues. Cloud computing offers an instant infrastructure for advanced data analytics, without the need for purchasing and maintaining hardware and software. Data analysis supports organizations to realize the business needs for the future, and synchronize or align technology requirements accordingly.

Managers can apply the result of the study in articulating a comprehensive action plan for achieving greater business-IT alignment and enhancing the effect of IT on the business. Consultants can make use of this study to help a client in determining how strategic business alignment with cloud computing should be developed and what is its consequences. This study emphasized that the size of the firm does not influence IT-business alignment in the cloud computing platform as CCT provides IT functionality to small and large firms alike. All sizes of firms are aligning cloud computing with business because it assists in renovating their technological operations by setting-up flexible and adaptable IT infrastructure to meet the changing business needs.

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Another important implication of the study is CCT-business alignment will be improved by the trust that is developed between the firm and cloud provider. This trust develops through effective communication between them when vendors clearly describe cloud benefits to the firms and outline potential risks and the procedures that are in place like data center provisions, disaster mitigation processes, advanced storage, compute, and networking designs and outage SLA and recovery plans.

The finding of the study highlighted the lack of partnership between the IT staff and business executives in a cloud computing paradigm. Seth Payne (2013) emphasized that firms that have adopted or planning to adopt cloud computing should recognize that they are entering into a partnership with their cloud provider. The findings of the study give several important implications for both theory and practice.

The alignment of cloud-based infrastructure with business strategy is important for the firms. Organizations require managers with technical and business skills that guide in developing technology roadmaps (Marston et al.’ 2011). The managers should able to decide on which applications are best placed for moving to the cloud and how to implement the changes in the minimum disruptive manner.

This study highlighted a lack of collaboration between the IT staff and business leader related to sharing of cloud computing risk and reward strategies. Besides, the business might face organizational inertia as shifting to a cloud computing environment might transform the role of IT departments in the organization. Hence firms need to strengthen the IT-business partnerships by involving IT units in recommending ideas for IT-driven innovation and handling the change in the organization and supplying the applications and infrastructure required to support the operation of the firm's business.

The main theoretical contributions of the study are threefold. First is to develop a strategic maturity model related to business and IT alignment in a cloud computing paradigm. Second to examine the various factors that influence CCT-Business alignment in the firms iii) to examine the impact of CCT-Business alignment on the performance of the firm. The key practical contributions of the study offer insights to both managers and cloud providers into the extent to which cloud-based solutions are effective in aligning the business strategy with IT infrastructure and improving firm performance.

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This study has some limitations in selection of geographical locations, sampling distribution and mediating and moderating effects of other organizational, technological and environmental factors that may influence CCT-business alignment. The research consists representatives from the Indian firms, mainly from the metropolitan cities like Bangalore, Hyderabad, Mumbai, Gurgaon, and Chennai. Hence, it might not reflect the suitable population of India. The future research will cover all the metropolitan cities of India proportionally and increase the sample size. One more limitation of this study is that it explores the factors of CCT-business alignment of adopter firms of India only.
Therefore, in the future data will be collected from adopter firms of other countries in order to improve the scope and validity of the results.

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Appendix A. Measurement Scales

Communication Maturity (CM) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
CM1	Cloud computing technology (CCT) understands the organization's business environment.
CM2	Business organizations understand the CCT environment (e.g., current and potential capabilities, systems, services, processes)
CM3	Business Organization communicate effectively with CCT consultants, CCT vendors, and partners.
CM4	CCT disseminate organizational learning internally through intranets, bulletin boards, education, meetings and email.
CM5	Knowledge sharing (intellectual understanding and appreciation of the problems/opportunities, tasks, roles, objectives, priorities, goals, direction, etc.) exists between CCT and business.
CM6	Business liaisons are used to facilitate relationship development between CCT and the business.
Value Analytics (VA) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
VA1	There is routine assessment and review of CCT investments across the organization and partners.
VA2	CCT contribute to the accomplishment of the organization's strategic goals.
VA3	CCT-business continuous improvement practices (e.g., quality circles, quality reviews) and effectiveness measures are in place.
VA4	Business Organization measure its own performance and the value of its CCT projects.
VA5	Business Organization evaluate what went right and what went wrong after CCT projects are completed.
VA6	Business Organization's internal processes are improved so the next CCT project will be better.
VA7	Service level agreements (SLAs) exist between CCT and functional organizations as well as enterprise wide.
IT Governance (ITG) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
ITG1	CCT react/respond quickly to the organization's changing business needs.

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ITG2	Business Organization connects its business strategy to CCT priorities, technical planning, and budgeting.
ITG3	CCT projects flow from an understanding of the business strategy.
ITG4	CCT projects support the business strategy.
ITG5	CCT investment decisions are based on CCT's ability to create competitive advantage and increase profit.
Partnering (PA) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
PA1	Business and IT departments have forged true partnerships based on mutual trust and sharing risks and rewards.
PA2	Business Organization has formal processes in place that focus on enhancing the partnership relationships that exist between CCT and business (e.g., cross functional teams, training, risk/reward sharing).
PA3	The association of CCT and business is a long term partnership and valued service provider.
Dynamic IT Scope (INF) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
INF1	CCT infrastructure is viewed as an emerging as resource to enable and fast response to changes in the marketplace.
INF2	Business or IT change (implementation of a new technology, business process, and merger/acquisition) is transparent across the organization and to business partners.
INF3	The components of CCT infrastructure are integrated across functional units and strategic business partners.
INF4	The technical staff understand business drivers and speak the language of business.
INF5	Business organization fosters an innovative entrepreneurial environment.
INF6	Business organization recognize the need for change and change readiness programs.
Skill Maturity (SM) Source: (Luftman, J., Lyytinen, K., & Zvi, T. B. (2017)) - adopted and modified	
SM1	The organization provide opportunities to learn about support services outside the employee's functional unit (e.g., programmers trained in product/service production functions, customer service trained in system analysis) using programs such as cross training and job rotation).
SM2	Business organization provide career crossover opportunities among IT and business personnel.

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SM3	Formal programs are in place to attract and retain the best IT professionals with both technical and business skills in the organization.
CCT-Business Alignment (CCBA) Source:Gerow, J. E., Grover, V., Thatcher, J. B., & Roth, P. L. (2014) - adopted and modified	
CCBA1	We identify the fit between our business related strategic opportunities and our CCT infrastructure
CCBA2	Our CCT infrastructure aligns with our business strategies
CCBA3	Our business infrastructure and CCT strategies correspond to each other
Firm Performance (FP) Source: Gerow, J. E., Grover, V., Thatcher, J. B., & Roth, P. L. (2014)	
FP1	The return on corporate investment position relative to competitors
FP2	The market share gains relative to competitors
FP3	The sales growth position relative to competitors
FP4	The net profit position relative to competitors
FP5	The financial liquidity position relative to competitors

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