

# Multifaceted Scope of Supply Chain: Evidence from Indonesia

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**Objective:** Previous studies found that the main reason for failure in supply chain organisation was the inability to adapt to the major element of modernization. The purpose of this research paper was to examine the multifaceted scope of supply chain with respect to cloud computing, to investigate the performance of a supply chain department that is equipped with cloud-supported supply chain information systems, to understand the sustainability of an organisation driven by the theory of resources based view, and moreover, to explore the controlling influence of management. **Methodology:** Data was collected from different firms operating in Indonesia using cross sectional analysis. Structural Equation Model has been used to examine the connection between cloud-supported supply chain information system and resulting performance based on proposed prototype. **Results:** Findings revealed that cloud computing has a very progressive influence on supply chain and that cloud-supported supply chain information systems are positively connected with performance, which ultimately affects an organisation's sustainability. Management influence regulates the association between three core areas, which are performance of supply chain department, suppliers, and internal processes. In addition, management does not have any controlling influence in integrated customer management and related supply chain performance. **Repercussions:** Considering the advantages of cloud computing with respect to supply chain, as testified in this research paper, there is greater need for managers to recognize that it is now a prerequisite for supply chain departments to have established cloud-supported information systems that will facilitate the enhancement of performance and organisation sustainability. **Originality:** This study extends upon previous literature, where the impact of information technology on the

performance of supply chain departments was gauged but with conflicting results. Cloud computing has been influential in the progression of Information Systems and Communication, whereas incorporating the technology in supply chain is considered bombastic. This research paper attempts to solve this enigma by abstracting the multifaceted scope of supply chain management supported by cloud computing and investigating the manner in which it influences an organisation's supply chain and ecological performance. This research paper is distinct in its incorporation of cloud technology in supply chain. Similarly, the controlling influence of management also contributes to the existing literature on supply chain management.

**Key words:**

**Introduction**

Masaaki Kotabe, Janet Y. Murray (2017), states that in this modern age, supply chain organisations have to fight a very intense battle with their competition. This has forced organisations to form collaborations [Gregory T. Gundlach Robert Frankel Riley T. Krotz, 2019]. These collaborations ensure a well-organized process through which product reaches the right customer in a timely manner [Rahman, S.-U. and Bullock, P., 2005]. Designing a logistic system that can meet the demand and supply needs, and which is efficient in its overall operation, can be crafted through sufficient collaboration with business associates [Hau-Ling ChanTsan-Ming ChoiShuyun Ren, Bin ShenWing-Yee Wong, 2019]. John E. Spillan, Alma Mintu-Wimsatt, Ali Kara [2018], in reference to supply chain practices and related operational amalgamation, states that it is the connection of prime operational processes and functions, both internal and external, with suppliers that establishes a unified and effective business prototype. Moreover, precise decision making requires integrated supply chain management, which ensures that information flows in the right direction and maintains balance between material and funds [Rajesh Rajaguru, Margaret J Matanda, 2019]. Coyle, J.J., Langley, C.J., Novack, R.A. and Gibson, B. [2016] highlighted that organisations are now realising the importance of effectively managing their demand with the help of technology that facilitates an organisation's harmonisation with their supply and demand. This ensures precise inventory management and timely order delivery. Organisations with a global presence have different challenges to meet; again, technology has been very helpful for such organisations by accurately predicting market changes and recommending adjustments that are in accordance with the requirements of their targeted consumers.

Integrating information technology in supply chain processes is not a new phenomenon; existing literature is filled with examples of organisations that have incorporated various forms of technological advancement in their operational procedures, including transitions

from traditional business to e-business and e-supply chains, as well as inventory replenishment systems, product flow and tracking systems, financial flow and control systems, and e-logistics [Prajogo, D. and Olhager, J. (2012); & Y Priyadi and A Prasetio (2018)]. Despite refining their functional and tactical proficiency and incorporating updated technologies, organisations' overall mechanisms still lack driving force, which is to be expected from such innovations [Shi, M. and Yu, W., 2013].

Deng GeYi PanZuo-Jun (Max) ShenDi Wu, Rong YuanChao Zhang [2019], highlighted that incorporating customary technological aspects in supply chain processes may result in a reduction of transaction cost, which would ultimately improve the performance of the department. Moving from traditional approaches to more innovative cloud computing can be a big challenge for any organisation. Similarly, it is difficult to find experiential studies on this subject, which further strengthens the overall narrative. Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J. and Ghalsasi, A. [2013] define cloud computing as Information and communication technology supported prototype which fulfil the demands of consumer by providing them with hardware and software utilities through internet and not restricted by any location or device. Studies also highlight that the incorporation of cloud technology in supply chain processes is still at a very early stage, and further experiential studies are required for management to understand the latest technology and integrate it in their operational processes. Many organisations have shown their interest in adopting this cloud technology, so this research paper will examine the motivation behind the adoption, rather than highlight the usefulness of the technology.

Prior studies have examined the impact of Information and Communication technology on supply chain performance, where technology was mainly used to manage the information flow among the different functions of an organisation [Prajogo, D. and Olhager, J. (2012); Shi, M. and Yu, W. (2013)]. The results were not concrete and they ignored the multi-dimensional aspects of supply chain integration. Small numbers of research papers have considered the multifaceted aspects of Information technology and its influence on supply chain performance. Although information and communication technology has been shown to improve an organisation and has also resulted in cost efficiency by assimilating the sub-disciplines of supply chain, few papers have analytically examined the possible effectiveness of cloud computing as a facilitator and the impact it will have on supply chain performance. Bruque-Cámara, S., Moyano Fuentes, J. and Maqueira- Marín, J.M. (2016) identified a progressive influence of cloud technology advancement on the informational and physical domains of supply chain, as well as its functional capacity. There are other importance elements to consider while studying cloud computing and supply chain, which include external influence of supplier and end user utilising cloud technology facility. These do play an important part, but existing literature on these vital elements is absent. Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J. (2013) states that an organisation's distinct features,

including ideology, culture, process flow, information sharing, and synchronization, to name a few, all have a significant influence on decisions concerning cloud technology adoption. Researchers have studied cloud technology and supply chain simultaneously, but they have ignored the multifaceted aspect of supply chain integration and its related impact on performance. The exclusivity of the research paper in hand lies in its consideration of cloud technology as a facilitator and, accordingly, its investigation of supply chain integration.

Other research papers have gauged performance as a lone notion [Shi, M. and Yu, W. (2013); & Prajogo, D. and Olhager, J. (2012)]; however, the impact of supply chain integration on performance seems to be varied and unreliable [Wen Luo, Yangyan Shi & V. G. Venkatesh, 2017]. There are other studies who have measured performance within a hierarchy, from operational performance to overall organisation performance. The study in hand has investigated the impact of cloud computing on supply chain integration and its related performance, which ultimately affect the organisation's sustainability. This paper theorises the likelihood of improvement in supply chain performance, and therefore organisation sustainability, with the inclusion of cloud technology. Researchers have identified five main dimensions with which to gauge supply chain performance: dependability, receptiveness, tractability, productivity and cost efficacy index [Marcio C. Machado, Renato Telles, Paulo Sampaio, Maciel M. Queiroz, Ana Cristina Fernandes, (2019)]. Therefore, the important thing to find out is whether cloud-supported supply chains can be influential in enhancing supply chain performance, which will result in improved sustainable performance for an organisation.

## Literature Review

Existing literature with respect to the integration of cloud computing in supply chain processes is very inadequate. The progression of cloud technology does not go back decades; it evolved just a few year backs, and there has been an increasing need to study the area of cloud-supported supply chain processes. The available literature with respect to cloud technology covers the modernization and embracement of technology for better organisational performance, flow of information and processing capacity, security measures, and privacy issues [Cegielski, C.G., Jones-Farmer, L.A., Wu, Y. and Hazen, B.T. (2012)]; however, other research papers have based their study on exploring whether the implementation of cloud technology can be helpful in achieving strategic objectives [Liliana Avelar-Sosa, Jorge Luis García-AlcarazAidé Aracely Maldonado-Macías, 2018]. Cegielski, C.G., Jones-Farmer, L.A., Wu, Y. and Hazen, B.T. [2012], while comparing the cloud technology with customary information and communication technology, identified that cloud technology enables users through on-call accessible computer controls, swift placement, less dependent setup, and lastly, minimal controlling cost. Cloud technology can be considered an

advanced modification of existing information and communication technology models, and a comprehensive study of supply chain operations is required [Jede, A. and Teuteberg, F., 2015]. So, there exists a great need to further investigate the experiential effect of cloud computing on supply chain assimilation.

### ***Resource Based View Model***

The groundwork of the research paper was established with consideration of the resource based view theory. Incorporating cloud computing in supply chain processes can provide organisations with an edge on their competition. Barney, J. [1991]. Resource based theory argues that if the tangible assets (for example technical expertise or installed information and communication system, to name a few) of an organisation can excel against the same assets of competition, then they can serve as a basis for gaining competitive edge. Researchers have also highlighted that processes that are supported by information and communication technology are more likely to outperform the other functions of an organisation [Sabherwal, Rajiv; Sabherwal, Sanjiv; Havakhor, Taha; Steelman, Zach, 2019]. In contrast, there are studies that argued that because the installation of these information and communication systems require huge investment, the impact of these systems on an organisation's performance is quite varied [Sandeep Kumar Vashist, 2019]. Jinho Kim, Yang Lu, [2019] states in his research paper that information and communication systems are installed for the purpose of enhancing the capability of an organisation and gaining a certain edge on their competition. Jinho Kim, Yang Lu, [2019] further argued that this enhancing of capability must also be evaluated based on whether the newly installed system synchronizes with the other functions of an organisation, so that its impact on an organisation's overall performance can be better realised. So, it is imperative for organisations to invest in those systems that support their other functions, including supply chain [Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J., 2013]. Information and communication systems can be rent-producing assets because they can prompt positive circulation from customers, a unique capability that is difficult for rival firms to match. The addition of cloud technology in the information and communication systems of an organisation, which might be in the form of a platform, structure, or other software, has a certain advantages over traditional information and communication systems [Carlo Alessandro Sirianni, Pierpaolo Singer, Parisa Sabbagh, (2019)].

### ***Cloud Technology Evolution***

In this age of industrialization, organisations have the huge task of not only collecting data but also processing it. This data plays an important part in the decision-making process of an organisation [Jede, A. and Teuteberg, F., 2015]. Specifically, for the supply chain operations, data management is vital because it provides precise, well-timed, and appropriate information

[Kache, F., Kache, F., Seuring, S. and Seuring, S., 2017]. The prevailing information and communication systems enable organisations to make appropriate decisions on acquisition, manufacturing, circulation, warehousing, purchasing, and post-purchase services. These business processes become very intricate as the volume and multiplicity of products grow. Similarly, organisations also have to deal with external partners with whom the organisation has diverse agreements. This further increases the intricacy of the business, as thorough monitoring is required to avoid mishaps [Gunasekaran, A., Subramanian, N. and Rahman, S., 2015]. However, Janne M. Denolf, Jacques H. Trienekens, P.M. (Nel) Wognum, Verena Schütz, Jack G.A.J. van der Vorst, and S.W.F. (Onno) Omta [2018] suggested that the inclination to provide correct information is a very important factor in the processing of precise data through an information and communication network. Limitations associated with traditional information and communication systems lead to the embracing of a much-updated cloud technology across the different functions of an organisation [Cegielski, C.G., Jones-Farmer, L.A., Wu, Y. and Hazen, B.T., 2012]. Outdated Electronic data interchanges, which used to exchange information between two companies, does not have the capacity to meet the need of an aggressive global market [Taylor, K., 2014]. Embracing cloud technology has been the main construct of this research paper, particularly how the inclination to embrace cloud technology by upgrading existing information and communication systems is a possible facilitator of supply chain integration. There are three core areas connected with supply chain operation: internal operations, supplier, and customer. These areas need to be unified in order to have smooth information processing through cloud technology.

Norizan Anwar, Mohamad Noorman Masrek, Mad Khir Johari Abdullah Sani [2018], while highlighting the limitations associated with existing information and communication systems, states these systems lack the adaptability and approachability to oblige intricate business necessities unless there is major modification in overall ICT structure. In today's world, supply chain operations are overly reliant on information and communication systems that facilitate accurate estimations, actualization of purchase orders, and post purchase services. There has been a certain level of unpredictability associated with information and communication structures, which assist in business operation, adjust to business needs, respond to alterations, support actions subsequent to alterations, and have self-supporting capacity [Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J., 2013]. There is a high possibility that existing information and communication systems lack the aforementioned functionality to be exposed to a supply chain-related platform. Information and communication systems are an asset to an organisation, and disparity at any level might have adverse effects and, ultimately, disturb overall balance. Small vendors use a very common modes of communication, including fax, email and telephone, to name a few, whereas medium to large vendors are affluent and have invested in far superior information and communication systems that include ERP (Enterprise Resource Planning), PDA (Predictive Data Analysis) and CRM (Customer Relationship Management).



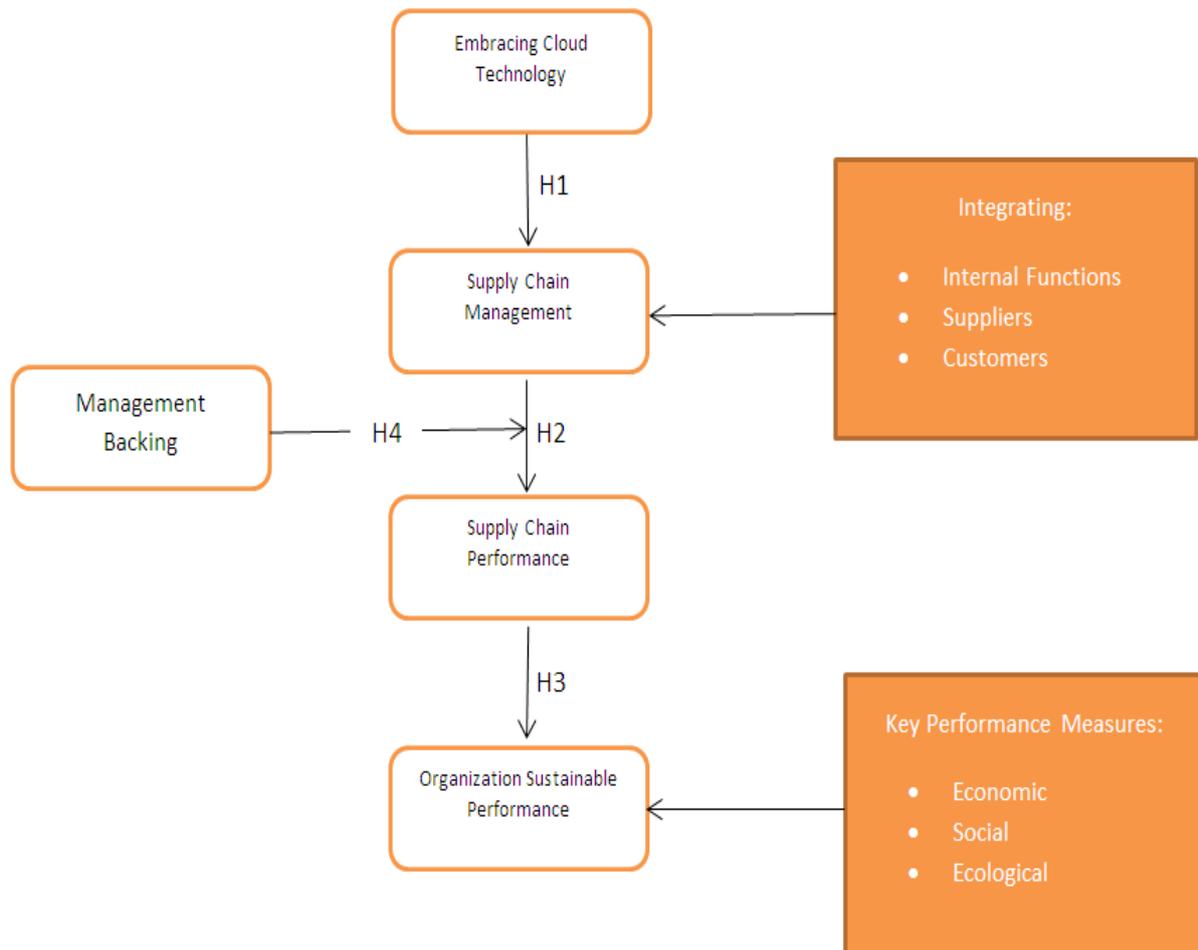
Information exchange seems to be fragmented due to the inadequacy of information and communication systems installed by small and medium vendors. Additionally, the traditional electronic data interchange does not have the operational capability to meet with growing needs of this dynamic global market [Taylor, K., 2014]. Inconsistency among communication mediums has been the major concern for efficient supply chain operations. Organisations and their associates are very much self-reliant in their installation of information and communication systems, but their outdated systems lack the capacity and capability to function efficiently when processing information that crosses company boundaries.

Consequently, there is need of a well assimilated information and communication system that will allow organisations to have far-reaching digital access. With the evolution of cloud technology, organisations can develop their information and communication systems according to their needs. Integrating cloud technology in information and communication systems gives organisations a competitive edge that was missing from traditional forms of ICT [Jinho Kim, Yang Lu, (2019)].

### **Research Structure & Hypotheses**

Figure 1 represents the conceptualization and accordingly developed hypothesis with respect to cloud-supported supply chain management. The following section discusses the logical explanation behind hypothesis development.

**Figure 1.**



### Link between Supply Chain and Cloud Computing

Several business viewpoints have been considered to explain cloud computing in the above-presented argument, which seems feasible for supply chains, the area of concern. This explanation further elaborates that end users will pay to utilise cloud services that support basic exchange of information and that are not restricted by any locations or boundaries. Researchers have highlighted some benefits of cloud technology: hardware facilitation; instant and easy access to software, deprived of any significant investment; novel and easy-to-use applications without any visible restrictions; analytical facilitation and the ability to process large quantities of data; and lastly and quite significantly, minimal cost. These benefits motivated small and medium enterprises to come into in the industry. Contrasting viewpoints exist that argue that organisations with stable business tend to have very strong information and communication system and are very much self-sufficient, so there is a possibility that they embrace cloud technology for a particular task, as their existing system does not have the capacity to deliver timely results. The frequency of adopting cloud

technology is slightly higher in small and medium organisations because they find it cheaper to implement, it is easy to use, and they are able to pay its expenses as they arise. Nonetheless, embracing cloud technology is contingent on the objectives that an organisation wants to achieve, which may be the need for the fast processing of information; capacity enhancement; security concerns, which can be interior as well as exterior; and a system that is compatible across the organisation [Gangwar, H., Date, H. and Ramaswamy, R. (2015); & Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J. (2013)]. There are organisations that have realised the importance of cloud technology and have slowly and gradually implemented it into their supply chain operations; whereas others are yet to recognize the possible advantages they can gain by integrating the technology into their supply chain processes.

Embracing cloud technology is not only beneficial for organisations but also for its external partners. Installing cloud technology will help the supplier locate their orders and manage their inventory; help the customer with their order and position of inventory; and, lastly and most beneficially, accurately inform an organisation of their sales figure and inventory status so that they may make strategic decisions based on the numbers provided. This cloud-supported information and communication system will create a harmony between organisations, suppliers, and customers, which can be considered a pillar of an organisation's success organisation. So, since this is all based on an organisation's inclinations, it can be assumed that the inclination to embrace cloud technology will positively reflect in the integration of organisation, supplier, and customer. Consequently, the following hypothesis can be presumed:

H1: Embracing cloud technology will progressively affect the supply chain management.

### **Link between Cloud-supported ICT systems and Performance**

Cloud technology serves as the both the environment and facilitator of information exchange across organisational boundaries. The main advantage associated with cloud technology is that it uses IP (Internet Protocol) addresses, which allows organisations, suppliers and customers to share information simultaneously. This basically establishes a unified flow of information that can be used for sales and manufacturing forecasting, tracing order status, and tracking inventory levels. All this information will allow organisations to establish an integrated supply chain process [Coyle, J.J., Langley, C.J., Novack, R.A. and Gibson, B., 2016]. In a traditional ICT structure, there exists a high risk that information shared may be inaccurate; using cloud technology can minimise this risk by showing the actual position of stock, which will benefit all connected associates. Furthermore, by using cloud technology, organisations can synchronise supply and demand, as all partners are linked through a unified

system, and customer requests can be answered through well-organised refilling of stock [Soosay, Claudine, Kannusamy, Raja, (2018)].

H2: Cloud-supported supply chain processes will have progressive influence on performance.

### **Link amid Cloud-supported performance and organisation sustainability performance**

Researchers have studied the notion of cloud-supported supply chain assimilation, but there is still quite a big information gap on the impact that cloud-supported supply chain integration has on the performance of an organisation [Jede, A. and Teuteberg, F., 2015]. Previous studies have considered organisation performance as a solitary notion for gauging functional performance [Maria D. Moreno-Luzon Juan P. Escorcia-Caballero Odette Chams-Antur, 2018]. The research paper in hand has evaluated performance in two stages: firstly, supply chain performance, which resulted from cloud-supported supply chain integration, has been measured; and secondly, the impact of supply chain performance on organisation sustainability has also been measured. Organisation sustainability performance has been gauged on three main parameters: ecological, social, and economic. Researchers have argued that the performance of a supply chain should not only be measured through consideration of economic viability; its effect on the environment and the social responsibility of the practices should also be given equal importance [Parmigiani, A., Klassen, R.D. and Russo, M.V., 2013].

Multiple studies have identified that an organisation's technical expertise can positively affect the performance of supply chain through capacity enhancement; however, there is a possibility that it will not affect the economic performance of organisation. Findings from different research papers have also revealed varying and unpredictable results; however, it is difficult to ignore the ancillary effect that supply chain performance will have on an organisation's sustainability performance. So, the following hypothesis can be presumed:

H3: Supply chain performance supported by cloud technology will progressively affect the organisation's sustainable performance.

### **Management being the Arbitrator**

Abdalla Shwairef, Azlan Amran, Mohammad Iranmanesh, Noor Hazlina Ahmad [2018], highlighted that often, organisations embrace information and communication systems in order to achieve cost effectiveness, which validates that organisations are very open to the idea of digitalizing their supply chain operations. Researchers also argued that organisations tend to embrace the technology, as management considers it a standard that they need to match [Hossein Ahmadi, Leila Shahmoradi, Farahnaz Sadoughi, (2018)]. Other researchers

identified that rapid change in information technology also prompts the management of an organisation to consider embracing new technology [Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J., 2013]. The extant literature is filled with examples of management's role in initiating the installation of information and communication systems in their supply chain department [García-Sánchez, E., García-Morales, V.J. and Bolívar-Ramos, M.T. (2017)]. Management mindfulness also plays an important role, as it highlights the importance that they attribute to technology that can generate value for the organisation [Tarofder, A.K., Azam, S.F. and Jalal, A.N. (2017)]. There are external and internal pressures that also influence the management of an organisation to adopt technology, such as market conditions, as it is important for organisation to be innovative as well as competitive.

Spending in cloud technology is not an easy decision to make, as certain risks are associated with it, which will depend on management's inclination and the level of innovation that they consider to be justifiable [Deng GeYi PanZuo-Jun (Max) ShenDi Wu, Rong YuanChao Zhang (2019)]. The common perception of incorporating technology into supply chain operations is that it provides more value than its cost, it can be implanted easily, and it can be very useful in maintaining equilibrium between supply and demand. Researchers have also pointed out that the user-friendly tags associated with cloud technology are more of a perception than an actual reflection [Liliana Avelar-Sosa, Jorge Luis García-AlcarazAidé Aracely Maldonado-Macías, (2018)]. Organisations' inclination to embrace cloud technology is more related with achieving strategic objectives. Studies have investigated the role of technology in achieving operational efficiency, but studies specifically designed to investigate the benefits of cloud technology as an innovative tool are far rarer. Cloud technology can help organisations to connect their partners on a single platform. It will also improve the speed of data processing, which ultimately helps organisation in their decision-making process. So, complete managerial support is required to implement cloud technology at every level of an organisation. In this context, the following hypothesis can be presumed:

H4: Cloud technology that is backed up management support can progressively regulate the connection between supply chain integration and related performance.

### **Research Methodology**

Data was collected through an online survey, which is less costly and time-consuming. The target audience for the research paper was selected from employees and companies listed on Asosiasi Logistik Indonesia (ALI) and Bursa Indonesia. 250 individuals, all registered with ALI, who worked in different capacities in the supply chain departments of different organisations were selected. Similarly, out of 811 companies listed with Bursa Indonesia, 250 companies were selected to fill the questionnaire. Qualtric Software was used to conduct the

research, which allowed for further evaluation of the results through direct data configuration in SPSS software.

A total of 38 responses were received from members associated with ALI, which is a response rate of 15.2%. Similarly, 127 responses were received from companies listed on Bursa Indonesia, which is a response rate of 15.6%. On average, the response rate was 15% of the total population surveyed, which can be considered an adequate response rate.

### **Questionnaire**

Likert scales, which are an effective way to gauge both extremes, were used to efficiently measure the variable. Similarly, different personnel working in the supply chain departments of different organisation, academic professors, and IT professional were asked to comment on the questionnaire, which further authenticates the matter and appearance of the survey. Subsequently, asked changes were included in the questionnaire, which was then uploaded to Qualtric software and finally was circulated towards targeted audience.

Different theories have proposed two sub-notions with respect to the concept of embracing cloud technology: features and inclination. Researchers have suggested that there is no direct relation between these two notions; rather, they are conversely associated [Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J., 2013]. This argument reflects the fact that if the technology has many functional aspects, then there is a greater chance that an organisation will be unwilling to embrace it. The capacity of existing information and communication systems is also an important factor that management needs to consider while upgrading their system, as modification should not imperial the whole structure. In order to gauge the adoption inclination, items were selected from the research study conducted by Wu, Y., Cegielski, C.G., Hazen, B.T. and Hall, D.J. [2013]. Supply chain integration supported by cloud technology was measured by selecting the items from the research study conducted by Wiengarten, F. and Longoni, A. [2015]. The concept of management being an arbitrator was conceptualized from research work of Rosanna Cole, Mark Stevenson & James Aitken [2019]. Similarly, the Wiengarten, F. and Longoni, A. [2015] study was used to select items for the purpose of measuring supply chain performance, as well as related key performance indicators.

**Data Analysis**  
**Demographics**

**Table 1:**

<b>Features</b>		<b>Frequency</b>	<b>Percentage</b>
<b>Size of Organisation</b>	Small	34	21%
	Medium	57	35%
	Large	70	43%
<b>Sales Revenue (In Million)</b>	≤ 0.99	13	8%
	1 to 50	37	23%
	51 to 99	40	25%
	≥ 100	71	44%
<b>Industry</b>	Manufacturing	65	40%
	Construction	24	15%
	Service	31	19%
	Others	41	25%
<b>Respondent Position Level in organisation</b>	Top Management	43	27%
	Mid-Level	83	52%
	Others	35	22%
<b>Decision Making Involvement</b>	High	70	43%
	Moderate	63	39%
	Low	28	17%
<b>Plan or Involvement in Cloud Technology</b>	Using Cloud Computing	57	35%
	Planning to embrace within a year	64	40%
	No plans to implement	40	25%

SPSS software was used to descriptively analyse the data, whereas AMOS software was used to examine the measurement and structural prototype. The analysis has been bifurcated into two main phases: the investigation of unequivocal influence and mediator influence. To begin with, we tested the unequivocal influence of embracing cloud technology on supply chain management and related integration, which is followed by an examination of the influence of cloud-supported supply chain integration on the overall performance of the organisation. In order to examine the assumed hypotheses, the average scores of the latent variable were accumulated into their specific observed variable. It helps to lessen the intricacy of sample statistics, thereby increasing the degree of freedom and decreasing chi square. Utilising the observed variable, a path coefficient was calculated for embracing cloud technology, supply chain management and integration, supply chain performance, and organisation ecological performance. Moving to the second phase, mediator influence of the top management was examined by exploring the arbitrator role of management and how it connects with supply

chain integration and related performance. This was achieved by investigating the concurrent effect of the latent variable by calculating the factor values. In order to determine a factor score, factor and varimax rotation was performed.

Reliability and Validity were investigated for all gauging parameters; a measurement model comprising all latent variable was then examined to verify the goodness of fit. The results reveal average fit. There was the possibility of enhancing the model fitness, but in order to retain the important variable of customer integration, the potential enhancement was ignored. Customer integration is as significant as supplier integration or internal integration in relation to supply chain management. Reliability and validity tests also back this contention.

Cronbach's alpha reliability and composite reliability tests were conducted on the measurement model. The results obtained from the test revealed an acceptable degree of consistency, as all values were greater than the threshold value of 0.7, except one variable, embracing cloud technology. Values achieved through composite reliability tests also indicated satisfactory results. Values of Average variance extracted were also greater than the benchmark of 0.5 for all the main constructs except for embracing cloud technology. This also reinforced the convergent validity of all the variables. Disparity in the items can be elucidated through latent structure analysis. This further signifies the convergent validity of all the major concepts used. Nunnally, J. and Bernstein, I. [1994], suggested that average variance extracted should be greater than 0.4, which provides essential support for retaining the construct 'embracing cloud technology'. Results concerning Construct Reliability, Cronbach's Alpha, & AVE are given in Table # 2.

**Table 2: Construction Reliability**

Variables	Items	Value	Composite Reliability	Cronbach's Alpha	AVE
Customer Integration	2	0.773	0.75	0.73	0.56
	4	0.758			
	5	0.801			
	6	0.721			
Top Management	1	0.789	0.74	0.74	0.51
	3	0.752			
	4	0.714			
Social Performance	2	0.773	0.79	0.78	0.58
	3	0.854			
	4	0.792			
	6	0.811			
Embracing Cloud	1	0.714	0.70	0.69	0.49

Technology	2	0.782			
	4	0.845			
	1	0.751			
Ecological Performance	3	0.901	0.84	0.82	0.69
	4	0.886			
	5	0.802			
Supply Chain Performance	1	0.894	0.86	0.85	0.61
	2	0.857			
	4	0.932			
	5	0.863			
Supplier Integration	2	0.823	0.80	0.78	0.55
	3	0.872			
	4	0.854			
	5	0.849			
Economic Performance	1	0.863	0.83	0.83	0.57
	2	0.907			
	5	0.858			
Internal Integration	3	0.819	0.87	0.85	0.64
	4	0.862			
	5	0.871			

Divergent validity was used to verify that there was no relationship between constructs. This was achieved by comparing the square root of average variance extracted of specific constructs with the correlation coefficient of the other constructs. Table: 3 showcases the results obtained, which indicates that square root of average variance extracted is greater than the correlation coefficient and therefore signifies that divergent validity is not a concern.

**Table 3: Results**

Const ructs	Custo mer Integ ration	Top Manag ement	Social Perfor mance	Embr acing Cloud Techn ology	Ecolog ical Perfor mance	Supply Chain Perfor mance	Suppl ier Integ ration	Econo mic Perfor mance	Inter nal Integ ration
Custo mer Integra tion	0.75								
Top Manag ement	0.286 **	0.72							
Social	0.257	0.331*	0.73						

Performance	*	*							
Embracing Cloud Technology	0.418**	0.534*	0.473*	0.67					
Ecological Performance	0.209	0.128	0.328	0.242	0.82				
Supply Chain Performance	0.351**	0.481*	0.501*	0.592	0.240*	0.79			
Supplier Integration	0.728**	0.265*	0.103	0.551	0.093	0.267*	0.75		
Economic Performance	0.312**	0.371*	0.631*	0.542	0.157	0.561*	0.198	0.77	
Internal Integration	0.523**	0.192	0.271*	0.336	0.001	0.168	0.385**	0.167	0.84

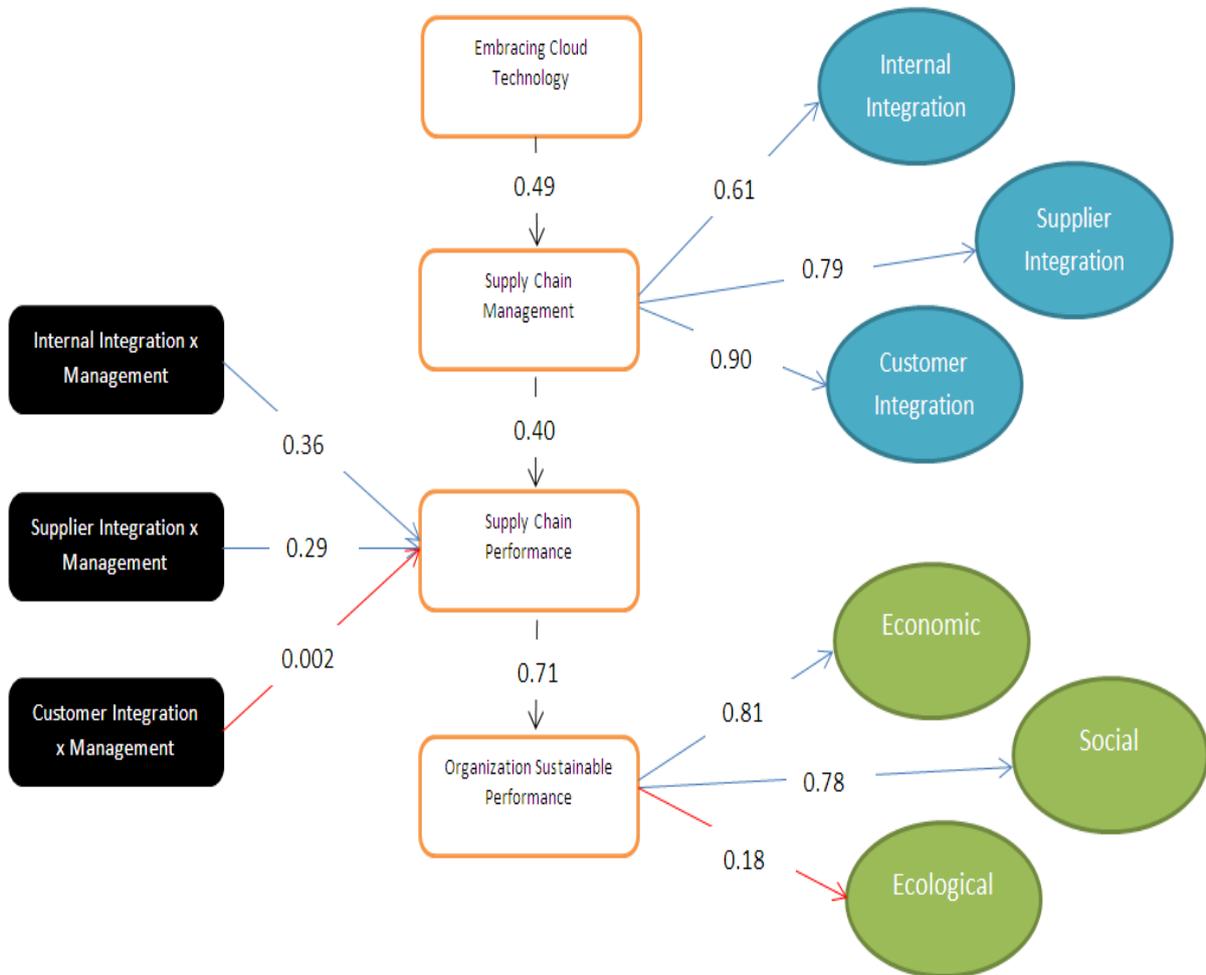
Note: \*p < 0.05; \*\*p < 0.01

Coefficient of Determination has been used to gauge the statistical significance of prototypes. R square signifies the percentage of difference in dependable variables, which is expected from independent variables. Results revealed that the inclination to embrace cloud technology has a very progressive influence on supply chain management and related integration. Similarly, supply chain integration significantly influences supply chain performance, which further positively influences organisation sustainability. Moreover, top management being the moderator progressively influences internal and supplier integration operations, but management has little effect on customer integration. Respondents were of the opinion that cloud-supported supply chain has very little to do with the customer standpoint. So, all four assumed hypotheses are substantial and sustainable. Findings are visible in Table: 4

**Table 4:**

Hypothesis	Value
Embracing Cloud → Cloud Supported SCM	0.49***
Cloud Supported SCM → SC Performance	0.40***
SC Performance → Organisation Sustainability	0.71***
Organisation Sustainability → Economic	0.81***
Organisation Sustainability → Social	0.78***
Organisation Sustainability → Ecological	0.18
Cloud Supported SCM → Internal Integration	0.61***
Cloud Supported SCM → Supplier Integration	0.79***
Cloud Supported SCM → Customer Integration	0.90***
Internal Integration x Management → SC Performance	0.36**
Supplier Integration x Management → SC Performance	0.29**
Customer Integration x Management → SC Performance	0.002
Note: **p < 0.05; ***p < 0.01	

**Figure 2.** Structural Equation Model



## Discussion

With respect to the literature that concerned the connection between information systems and supply chain management, the study in hand delivers vigorous examination of the ‘resource based view’ theory, while also analysing the effect of cloud-supported supply chain integration on the overall performance of an organisation. Evidently, cloud technology does not only simplify operational aspects, but also complements the prevailing assets of an organisation. Findings revealed that cloud technology can play a very significant role in improving the internal and external integration of supply chain, while simultaneously enhancing organisational performance. Moreover, the role of top management as arbitrator was also studied, showing that management-supported cloud-enabled supply chain integration can progressively influence the performance of an organisation.



Cloud technology has brought about a revolution in the field of information and communication systems, and it has changed the overall dynamics of existing business operations [Attaran, M., 2017]. There seems to be a great dearth of literature concerning the integration of supply chain management with cloud technology [Schoenherr, T. and Speier-Pero, C., 2015]. The research paper in hand examined whether supply chain associates who are connected through cloud technology are able to use operational strategies to achieve desired results. The Structural Equation Model has identified that embracing cloud technology not only assists in streamlining suppliers, but also provides the required efficiency for smooth integration of internal processes. This highlights that cloud technology has a direct effect on performance. This research has experientially examined the theoretical perspective on the ways in which cloud-supported supply chain integration can affect supply chain performance and overall organisation sustainability.

Previous studies have mainly focused on examining digital supply chain management and its impact on the performance of an organisation. With the recent evolution of cloud technology, there is very limited available literature concerning the role of cloud computing in supply chain management and how it can influence organisation performance and sustainability [Yu, W., 2015]. Due to its multi-dimensional functionality, cloud technology can build wide-ranging alliances between the different departments of an organisation, and at the same time provide a platform for cost-efficient information sharing. Existing information and communication systems have their own advantages, but in this age of modernisation, which has its own challenges, organisations need to be adaptable, or they might not be able to sustain themselves. Cloud computing is the answer to these challenges, as it helps organisations by integrating internal operations and external partners [Jede, A. and Teuteberg, F., 2015]. It also has advantages for organisations with global operations, for whom it can be a necessary source of consistency and tractability.

Top management influence with respect to embracing cloud technology cannot be ignored. Due importance has been given to the management role as an arbitrator in deciding whether or not to incorporate cloud technology in supply chains. The study in hand has investigated management's influence on internal operations, relationships with external suppliers, and customers. Findings indicated that management wields significant power in the role of arbitrator. They not only have the power to define the internal workflow but also exert significant influence through the outlining of collaboration guidelines with suppliers. Conversely, the simultaneous effects of top management and integrating customers do not seem to be noteworthy. Other researchers have also highlighted that an amalgamation of different resources does not always produce a symbiotic performance, as we have seen in this paper's research concerning customer integration [Wei Lisi, Rui Zhu, Chunlin Yuan, (2019)].

## **Conclusion, Implications and Limitations**

In this competitive world, organisations working with customary practices may find it difficult to survive. The ideology behind the current working environment is that you cannot resist change. The same can be said with respect to embracing cloud technology, because organisation needs to understand that cloud computing is the future and using traditional methods may no longer guarantee success. The multi-dimensional aspect of cloud technology has redefined the rules of the game. It has been able to integrate each and every corner of the organisation, whether internal or external. Using resource-based theory as a prototype was proposed which assumed a supply chain integration supported by customary information and communication system but has the capacity to assimilate cloud computing which enhance the proficiency of supply chain integration and progressively influenced organisation performance. Findings revealed that cloud-supported supply chain integration has a substantial and very positive effect on supply chain performance and organisation sustainability. Findings further indicated that management inventiveness and backing increased the possibility of embracing and utilising cloud technology.

The research paper has been able to expand the existing literature concerning information systems and supply chain integration. The study has presented a unique interconnection between three notions, which are cloud technology, supply chain integration, and performance. This interconnection was established on the theory of a resource based view and highlighted an important aspect of the modern age. The study has experientially analysed the possibility of incorporating cloud technology in existing information systems that support supply chain management. The study has been able to eliminate some doubts over the ability of cloud technology to help organisations achieve functional and business goals. Earlier studies have analysed the possibilities and limitations associated with independently incorporating cloud technology, rather than assimilating it with existing systems [Bruque-Cámara, S., Moyano-Fuentes, J. and Maqueira- Marín, J.M., (2016)]. The study in hand has suggested incorporating cloud computing with existing information and communication systems, which will progressively affect the supply chain integration and related performance. The study has also showcased the competitive advantage that cloud technology can provide to an organisation, as it has become a very common phenomenon across a range of mediums. In the context of a resource based view, cloud technology can help an organisation to establish a unique competitive edge. Lastly, this research paper has also been able to redefine the role of top management as an arbitrator. They can play a very critical role not just in introducing the idea of cloud technology, but also in establishing an approach where everyone can work together to ensure its smooth implementation [García-Sánchez, E., García-Morales, V.J. and Bolívar-Ramos, M.T. (2017); Gangwar, H., Date, H. and Ramaswamy, R. (2015)].



This study has some limitations as well. The inclination to embrace cloud technology is very much reliant on the intricacy of its functionality, as well as its ease of execution. This is because intricacy opposes simplicity, utility and acceptance [Gangwar, H., Date, H. and Ramaswamy, R. (2015)]. Given this, another variable, ‘intricacy of embracing cloud technology’, could be made a part of future research papers, which would identify how inclination is influenced by intricacy. This study has not considered the impact of external factors, such as suppliers, customers and competitors, on cloud-supported supply chain integration and related performance. Similarly, management ingenuity and its simultaneous effect do not influence customer integration, which can help organisations to achieve cost efficiency and better approachability in their targeted market. Larger samples may translate into better results with respect to customer integration. Lastly, this study has not found any effect that the size of an organisation has on its sustainability. This may be related to the small sample used, which did not permit the categorisation of organisations according to size, and therefore did not permit an examination of how size can affect the inclination to adopt processes that ultimately effect organisation performance and sustainability.

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