A Literature Review on the Application of the Cloud Technology in Supply Chains

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Abstract. *The use of cloud technology in business firms contributes to business process optimization and to building infrastructure, platforms and software solutions for the whole supply chain via Internet. The biggest advantage of cloud based technology systems is their simplicity. Cloud eliminates the compatibility problem by using the platform approach and enables connection in every part of the supply chain. Supply chain in cloud computing should be identified and controlled having in mind both business and technical perspective. Supply chain in cloud computing is network of interconnected business firms in the field of cloud technology that are included in provision of final products and aggregated service packages for final users. Business firms that are using supply chain management applications, like e-procurement, warehouse management, transport management, supply chain planning, business intelligence and analysis are already using SaaS solutions or setting clear strategy in order to organize its business activities in the cloud surrounding. The application of cloud technology can be divided into several supply chain activities. Activities like planning and forecasting, making catalogues, procurement, logistics and inventory management are activities within supply chain where cloud technology can be implemented most efficiently. Cloud technology has a great potential for value creation in any business firm. In this paper the usage of the cloud technology in supply chains will be described and the aim of the paper is to define theoretical framework of the cloud technology, analyze the existing literature on the usage of the cloud technology in supply chains and give a review on the future of the cloud technology usage in supply chains.*

Keywords. Cloud technology, supply chain, information technology

1 Introduction

The quality of information in supply chain is of extreme importance and is seen in three conditions which include acquiring the right information, maintaining the information correct and efficiently transferring the information. Information technology is of significant importance in every phase of supply chain management because it enables organizations to acquire and analyze information within and out of organization. Cloud technology contributes organizations in optimization of business processes, building infrastructure, building platforms and online software solutions for whole supply chain. Cloud technology has potential to create value for supply chain in any organization and therefore organizations are using cloud solutions for certain activities like net cooperation, administrative support, transport and logistical management. Activities within supply chain in which cloud technology can be efficiently implemented are planning and forecasting, making catalogues, procurement, logistics and inventory management. It is of extreme importance for contemporary companies to assess their cloud applications, make continuous plans for their improvement assessment and to react at the right time on clients' needs in cloud computing in global supply chain. The application of cloud computing in global supply chain shall significantly improve organizational features of companies and enable them to achieve business goals in the digital era.

The subject of this research is application of cloud technology in supply chains, while main goal of the paper is definition of theoretical framework of cloud technology, analysis of cloud technology application in supply chains and consideration of potential for cloud technology application in supply chains.

2 Theoretical framework of the cloud technology

Cloud is related to a special surrounding of information technology designed with the purpose of distance reservation of scalable and measurable resources of information technology. Cloud represents a certain metaphor for the Internet, i.e. a net of more interconnected nets that enable working on distance with aggregate of decentralized IT resources. Cloud is not the same as the Internet, since cloud is a unique surrounding for distance IT resources allocation and has its finite borders and also there can be more unitary cloud surroundings on the Internet (Erl, Mahmood & Puttini, 2013). Cloud computing is an aggregate of services on the Internet, usually in form of Infrastructure as a Service – IaaS, Platform as a service – PaaS and Software as a service – SaaS, and it is possible to lease any of the named services in business or private purpose which is a cheaper model than buying these services (Lamza-Maronić, Glavaš & Filko, 2012). Other authors, such as Fingar (2009) and Rittinghouse and Ransome (2010) are adding Monitoring as a service – MaaS and Communication as a Service – CaaS. Different business models that are achievable through cloud computing are presented in the work of Chang et al. (2013) as all-encompassing review of the future business framework, especially for small and medium enterprises.

There are computer services that are extremely important for work in modern organizations, no matter the size and profile of the organization, such as antivirus protection, safe copies and net disc space for saving documents. Cloud technology enables making of the services that satisfy quality and safety working standards. Space on net providers in the cloud that may be hired on the Internet is simple and favorable solution for the problem of local net disc space and at the same time it is a solution for the problem of safety copies, antivirus protection and risk of losses associated with abruption of IT equipment (Lamza-Maronić, Glavaš & Filko, 2012). Cao, Schniederjans and Schniederjans (2017) argue that at the moment safety and data breaches are one of the primary constraints for cloud technology application. Therefore, inter-organizational trust is of extreme importance between partners in the supply chain as a mean for announcing information in the cloud computing.

Basic value of cloud technology lies in the fact that it can be used as supporting and leadership technology in constantly changing and dynamic environment of supply chains net. According to Apostu et al. (2013) some of the main advantages of cloud technology usage are: cost efficiency, almost infinite saving space, safe copies and data return, automatic software integration, simple approach to information and quick transfer on new business modality. Markim (2015) argues that cloud technology enables supply chain management providers the ability to use new processes related to ethereal space. Further on, according to Gray (2015) inventory information is accurate at any time according to the cloud technology and users do not have to wait for central providers to fill in the information via the supply net. According to Maziliauskaite (2015) companies may use cloud computing in order to exchange data reviews on inventory and sales in the real time, which results in quicker integration of channels, more efficient supply chain and user analytics.

On the other hand, there are also some disadvantages of cloud technology usage. Desmond (2016) argues that, in spite of many advantages of the cloud technology, research also indicates a few of its disadvantages. First is related to the novelty of this technology that results in the lack of managerial insight in the application of the cloud computing. According to Connors (2016) the use of the cloud technology in the supply chain has caused managerial and compliance problems related to data on residency, sovereignty and security. For example, with SaaS, data saving and data maintenance are often conducted by third party companies. Organizations, especially smaller ones, have to be aware of certain risks when starting business activities that encompass cloud technology. Risks that most commonly occur when working with a cloud are related to technical difficulties and safety problems. Although data contained in the cloud may be approached from any location, there are moments when system has certain breakdowns. Organizations therefore have to be aware that this type of technology is inclined to technical abruption. Safety has to be pointed out as main disadvantage since organizations are sharing their data with service providers which may lead to certain risks. Organizations therefore have to choose reliable service providers that will keep their information in total safety. According to Apostu et al. (2013) there are following disadvantages of cloud usage in business activities: possibility of attacks, dependence on the Internet connectivity, non-compliance of application with business activities and lack of support from the service provider. It is necessary to identify and assess risks by using probabilistic risk analysis, such as the Fault Tree Analysis, Event Tree Analysis, Monte Carlo Analysis, Scenario Planning, Sensitivity Analysis, or Failure Mode and Effects Analysis. These risk assessment methods are useful only in case sufficient data is available. In case there is not enough accurate information available for risk assessment, Fuzzy techniques are more appropriate. Identified risk factors, the probability and severity of risk information, as also continuity plans for the case of crisis emergence, are necessary for the development of the risk optimization model (Vemula & Zsifkovits, 2016).

There are four different models of cloud technology implementation that are independent of service

providing models (SaaS, PaaS, IaaS) and each of four models is conducted on four different modes, in dependence of specific organizational needs. According to National CERT (2010) four modes of cloud technology in computing are: public cloud, private cloud, community cloud and hybrid cloud. Public Cloud is a platform that is available and open for the public and is in ownership of the company that sells cloud computing services. Public clouds offer changeable infrastructure which decreases safety risks and costs. One of their advantages lies in the fact that they are much bigger than private clouds and offer the possibility of increasing or decreasing of leased part of the cloud. Also the responsibility, in case of unplanned risks occurrence, lies on the service provider and not on the organization itself. The services of the public cloud are sold on demand, usually per minute or per hour. The buyers are only paying for saving or broadband width. Infrastructure of the private cloud is anticipated for usage of one organization strictly and it contains more business units. Banerjee, Paul and Biswas (2016) argue that private cloud services are delivered from the business data center to private users. This model offers practicality and versatility, but also management, control and safety. This model is used in organizations when they are trying to achieve higher degree of data control than can be achieved when using public cloud. In this case organizations have highest safety and control over data on their own infrastructure and may manage structure of the cloud on their own (Mell & Grance, 2011). In the community cloud infrastructure is anticipated strictly for usage of certain organizational community that shares certain missions, safety claims and policies. Finally, hybrid cloud is made of two or more different cloud types (public, private or community) that remain unique entities but are interconnected by standardized or appropriate technologies that enable efficient data or application transfer. Hybrid clouds are connecting public and private cloud models. The feature of private cloud expanding with public cloud resources may be used in order to maintain service levels in order to support high burden. The aim of the hybrid cloud is to make a unique scalable surrounding that helps in using all the public cloud infrastructure and that can help in control maintenance over the key data.

3 The application of the cloud technology in supply chains

Organizations are conducting research over efficiency of the cloud technology usage in supply chains. Organizations are exploring different methods aimed at cost optimization and increase of operational efficiency in every phase of the supply chain, such as planning, forecasting supply, logistics and related services. Supply chain management consists of design, planning, execution and control of all activities within supply chain, with the aim of increasing net value, building competitive infrastructure, using logistics around the world and synchronizing stocks and demand. Recent technology development enables organizations the exchange of information within these activities, but also coordination of activities related to chain management (Animesh & Megha, 2013). According to the research conducted by IDG Enterprise (2015), key factors (the speed of implementation, lower costs of ownership, enabling business continuity, exchange of technology, the need for data at the certain moment, quicker return on investment and improvement of the service) are encouraging investment in the cloud innovation in large enterprises. The research also indicates that there is significant difference in cloud spending between large enterprises on one hand and small and medium on the other. The research conducted in small and medium enterprises related to cloud adoption indicates that many of the enterprises do not believe that cloud is safe and are therefore following traditional information exchange methods with related parties (Gupta, Seetharaman & Raj, 2013). On the other hand, Vemula and Zsifkovits (2016) argue that usage simplicity and practicality are main factors for the cloud adoption in small and medium enterprises. Advances in safety and privacy are another important factor in the cloud technology adoption and following is cost reduction.

Cloud computing is designed as key technology in economies of scale in implementation and IT solutions and is a useful technology that contributes to business process optimization by providing infrastructure, platform and software as service and solution for whole supply chain via Internet. The usage of cloud computing based services contributes to financial and operational advantage. Some of advantages include: lower costs in comparison to local cost related to infrastructure, the stability of platform and flexibility of cooperation between cooperatives through supply chain.

The number of organizations using cloud technology as their primary manner of using applications is exponentially growing but organizations should keep on mind that cloud technology is a relatively new mode of business activity in organizations, i.e. in supply chains. Due to many advantages of cloud technology, organizations are interested in their application but may not fully be aware of risks and difficulties related to their implementation, some of which include high and unexpected costs related to professional education of employees related to cloud technology usage, new regulation and transition process. Although cloud solutions help in minimization of costs in the beginning, they usually increase repetitive costs (Troung & Riddle, 2014).

The service model of cloud computing combines general organizational approach for IT delivery, infrastructural components, architectural approach and economic model. The possibility of gaining resources and using and managing cloud computing infrastructure enables organizations to approach and use software like SaaS, PaaS or IaaS, which decreases total cost of ownership (TCO) in comparison with traditional data modeling centers. The infrastructure that supports cloud computing increases the possibility of adjustment, flexibility and scalability of gaining resources and using and managing bigger number of users and applications from one data center (Lindner et al., 2010). According to Gray (2015) there are three ways how cloud computing and SaaS may help enterprises to grow and develop and not just to solve current problems. These are: visibility, reaction to change and scalability. As for visibility is concerned, supply chains based on the cloud computing may enable all decision makers' full information on the supply necessity and inventory, where materials for fulfillment are available in the logistic system with newest and full data on costs and reliability. Related to reaction to change, even large enterprises that already know how to manage supply chains, are sometimes facing difficulty when going on new or bigger market. Members of the enterprise that are in primary interaction to clients and who see what is available on the shelves may enable decision makers or logistics of the third party to know whether there is sudden unexpected new demand or important feedback on certain item. Finally, related to scalability, software solutions based on the cloud are enabling resources during multiyear period or period of growth and then decrease in slow down period. If handled internally, sudden increase in new staff, followed by decrease in staff and decrease in IT budget, may cause moral problems and productivity problems.

Lindner et al. (2010) argue that the usage of supply chain concept in cloud computing is innovative and that it opens space for many possibilities. Supply chain consists of two or more associates connected with goods, information and cash fund flows. If cloud computing is added to these flows a unique definition of supply chain in cloud computing can be derived: supply chain in cloud computing consists of two or more associates supplied by cloud service and connected with information and funds. There are two general functions in supply chain and these are (Lindner et al., 2010):

1. Physical function that consists of manufacture from raw stocks or finished components and transport of all components on the right spot;
2. Intermediary function on the market that is used with the aim of ensuring that the product will be delivered to customer as the customer wants it.

Physical function dominates for functional products while intermediary function is more important for innovative products. Mixed features of supply chain in cloud computing are of great importance, such as insurance of software services that are main product of cloud services, but the most important is the intermediary function that is derived from modular design of these services. Supply chain in computing has to be identified and managed from business and technical point of view. Supply chain in computing is a net of interconnected organizations in the cloud computing area that are engaged in providing final products and aggregated service packages. Therefore, execution in supply chain is managed and coordinated by two-way service, information and funds movement through the whole supply chain in cloud computing. These movements include insurance of infrastructural services and services control, such as insurance of virtual engines and informational processes for accounting or payment process support. Kaufmann and Saw (2014) state that supply chain management is an integrative discipline, very closely related to key management functions, such as strategic management, marketing and finance. Stable processes in supply chain in dynamic surrounding are supporting enterprises' competitiveness (Ivanov & Sokolov, 2012).

Fig. 1 (Lindner et al., 2010) *The Cloud Supply Chain*) represents the components of supply chain in cloud computing. Service deliverers in cloud computing in supply chain may have several roles: providers of infrastructure, platform or software may be in direct contact with end users, i.e. organizations. They also may be intermediaries or business partners for certain service that, combined with services of other providers, offers new functionalities and this is how composite service is created. Example of this type of service is certain software that presents certain service on the top of one platform. This means that software as a service is the end product for organization. When this type of supply net is created it is very important to maintain visibility and transparency of all processes and data for control, accounting and payment. This type of service may be composite and is offered from service providers through cloud supply chain.

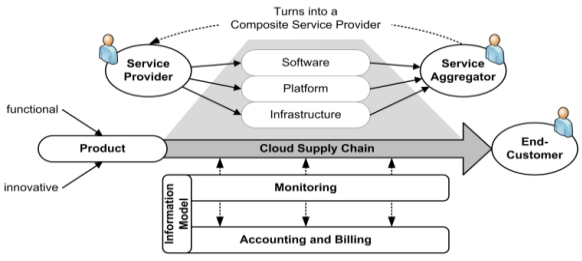

Figure 1. Components of supply chain in cloud computing

Lindner et al. (2010) classify products within supply chain based on demand patterns as functional and innovative products. There are three criteria a product must satisfy in order to be eligible for consideration as functional product:

- satisfaction of basic needs that are not significantly changed when analyzed in dependence with time;
- predictable and stable demand with low level of uncertainty and
- longer life cycles, usually longer than two years.

Functional products are good for competitiveness due to their stability which leads to lower product margin and consequences of their features are decrease in inventory costs, low diversity of products and slower obsolescence of products. On the other side innovative products are characterized by:

- feature that gives buyer incentive other than basic need to buy the product,
- unpredictable and changeable demand and difficulty in forecasting and
- short life cycle of the product, usually three to twelve months.

Innovative products require continuous innovation due to growing competitiveness but are inclined to achievement of higher selling margins for organizations. In general, products coming from new information technologies are classified as innovative products but they also have some characteristics of functional products. Cloud services have to satisfy basis user needs and increase competitiveness due to their renewability. Innovative characteristics in cloud services are represented in the fact that demand is unpredictable and there are many adjustments due to competition and changeable market needs in very short time period. Therefore, cloud services are to be classified as innovative with features of functional products. Cooperatives in supply chains are connected by data flows containing information and funds. Funds are related to payments between service provider and cloud infrastructure provider. There are several information types that are exchanged between service provider and cloud infrastructure provider, together with many sub processes in supply chain services.

According to Saideep & Aditya (2014) there are four ways how organizations may benefit from cloud technology usage related to key market trends that are redefining traditional supply chain:

1. non stabile conditions in supply chain - cloud technology contributes to quicker reaction on changes in supply chain,
2. non adequate information flow within and out of organization – organizations are required to have information flow through whole organization and by using cloud technology supply chain becomes one intelligent information net,
3. control of funds flow by digital tools – working in the cloud enables organizations higher flexibility, i.e. adjustment of their products and services,
4. end-to-end business – connected cloud enables cooperation in real time.

Cloud computing consists of several elements and these include clients, database centers and distributive servers. They also include break down tolerance, bigger availability, scalability, decreased burden for users, decreased organizational costs and on-demand services. Introduction of cloud technology helps in reducing compatibility problems when using the same platform for approach and simple access is provided, i.e. connectivity in all parts of the supply chain. Exchange of information of all participants in supply chain is ensured and cooperatives may easily be added within supply chain by using their identification marks and passwords. After that all participants are enabled to work with processes and applications on the same platform which decreases response time between participants of supply chain.

According to Animesh & Megha (2013) connectivity, technology, scalability and speed are four most important advantages of cloud technology application in digital supply chain. Picture 2 represents participants of digital supply chain and their connection that enables visibility and influence on supply chain in real time. Organizations can connect easily with their suppliers, buyers and sellers and these connected supply chain are becoming more dynamic and visible, approachable in real time, interactive and their abilities are compiled out of physical borders. Once digital supply net is connected analytics and usage of smart applications that are providing information for decision making are increased. These technologies enable supply chain managers proactive decision-making related to basic tasks. When supply net becomes connected with different new technologies it also becomes scalable which means that human resources, processes and technology are integrated and finally maximum efficiency is achieved by enabling organization to use individualized products and services. Once supply chain is built based on three previously named advantages, organizations have on their disposal higher speed of supply net and are able to successfully manage their operational tasks. More speed in planning and executing results in quicker market response and higher resources transfer within and out of organization.

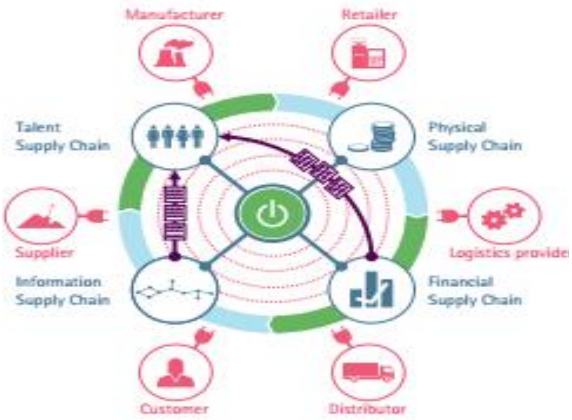

Figure 2. Advantages of digital supply chain

According to Fig. 2 (Saideep, R., & Aditya, S. 2014) one of the greatest advantages of cloud technology lies in the fact that it makes digital supply net extremely connected and therefore whole supply chain becomes very visible for all participants. Visibility is key factor in whole supply chain management and it makes whole buyer net more transparent. Systems based on cloud technology contribute to visibility of delivery in real time and improve logistic management.

Cloud technology is an important factor in changes of business process and it contributes to more efficient approach to innovative solutions for supply chain delivered through SaaS model. Organizations using applications of supply chain management, business intelligence and analysis, e-procurement, stocks management or transport management are already using SaaS solutions or setting clear strategy in order to organize their business activities in cloud surrounding. Applications of cloud technology may be divided into several activities within supply chain. The most common activities within supply chain in which cloud technology may efficiently be implemented are planning and forecasting, making catalogues, procurement and inventory management and logistics. In the context of planning and forecasting cloud platforms are designed in a manner to help organizations improve service level by coordinating participants (buyers, suppliers and distributers) that have key role in forecasting demand in the supply chain net. These platforms may collect data online, conduct basic analysis and more accurately conduct statistical forecast of demand for all participants in the supply chain. Processes in this supply chain activity lead do decrease of information asymmetry between different phases of supply chain which enables managers to be more aware of real market demand. When a buyer has certain demand, distributers are sending data into a public cloud which enables all information related to demand to visible in whole supply chain. In the context of making catalogues and procurement, cloud platforms are based on databases containing data from different suppliers and are therefore efficient for organizations that are analyzing this data. Based on this data organization can also choose those suppliers that are eligible for delivery of specified material in requested time period. In the context of logistics cloud technology is useful in inventory management, storage and transport due to the fact that it enables logistic operations tracking for more members of the supply chain. In this case integrated cloud platform offers advantages of more modern transport leading to savings in yearly cargo transport. In the context of inventory management cloud technology enables organizations to integrate logistic and adverse logistic in one closed loop in supply chain model. Radiofrequency identification technology (RFID) enables tracking of inventory location and sending this information into the cloud application. The end result of this activity is detailed insight into inventory movement visible to all supply chain participants, from manufacturer to the end user and vice versa. At the same time one cloud platform enables guarantee tracking, processing of inventory return, list of spare parts and status of reparation technicians.

Peerless Research Group (PSG) conducted a research in 2014 in companies included in logistic activities with the aim of researching changes in their habits and intentions in previous two years related to cloud software usage in supply chain. Approximately 70 % of companies included in the research responded that their software usage in supply chain has not been changed in this period, while approximately 26 % of companies named that software usage in their supply chain is in increase. These companies have also expanded their software packages in the researched period and have noticed improvement in inventory control and better transport visibility and control. The results of this research suggest that main reasons why companies are not using software solutions in higher extent are system differences and complexity of certain software integration into companies. 26 % of companies included in the research had planned to buy a new supply chain software in the year following the research and the solutions that they planned to buy or expand were Warehouse management systems – WMS, Transportation management systems – TMS and Inventory optimization applications. Approximately 17 % of companies believed that cloud technology is not the right solution for them due to security and data privacy risks, system reliability and data integrity (Jung & Kim, 2014). The combination of safety reasons, increased sensitivity to data privacy and a few private data issues have made companies very careful before starting to use cloud technology in business activities. The companies that are using and expanding cloud infrastructure are recognizing quality and related benefits of this business logistics, although they are trying to minimize the costs related to these activities, while companies that are indecisive related to cloud

technology usage in their activities have perception that information exposure and price are main disadvantages. Besides structural improvements, organizations are also reorganizing human resources that require additional learning and specialization.

Werber et al. (2015) have conducted a research in 2014 on Slovenian and Croatian micro enterprises' awareness on the cloud computing. The results were similar in both countries and suggest that the most important features of the cloud computing are reliability, safety and performance. According to this, cloud computing may present a good business opportunity for micro enterprises. The results of the research are also consistent with Rittinghouses and Ransomes (2010) research results that cloud services are useful solution for micro enterprises at the beginning when they are not able to invest in hardware and software. Most of the Slovenian micro enterprises (44 %) are interested in IaaS and then in SaaS (38,4 %) and 28 % in the full package (IaaS and SaaS). Other results are obtained on the sample of Croatian companies where most of the micro enterprises are interested in full package usage (43,1 %), while only 19 % in software solutions. No statistical differences were found.

According to Croatian National Bureau of Statistics (2015) the usage of cloud technology in Croatia is only at its beginning point and only 22 % of companies are using it in their business activity. The structure of cloud technology usage according to company size is even, i.e. there are no significant differences in its usage by small, medium or large enterprises. As for type of service, cloud technology is mostly used in business activities (37 %), service activities (27 %) and publishing and communications (19 %). According to service type in year 2015, 81 % of companies have used cloud technology for e-mail processing, 47 % for data storage and 43 % for accounting services and as office software. The company *Perpetuum Mobile* conducted a research at the end of year 2014 on 342 respondents on usage and attitudes of cloud technology users in Croatia. 55 % of respondents have pointed out that company they work in is using cloud technology. From the remaining 45 % being employed in the company that is currently not using cloud technology, 11 % have pointed out that their company has plans to introduce cloud technology into their business activity in the future. Respondents have pointed out safety (15 %), privacy (9 %), finance (7 %), lack of understanding (13 %) and lack of adequate IT skills (6 %) as main impediments to cloud technology usage in their company. Companies using cloud technology are mostly using public cloud (21 %), private cloud (19 %) and the least hybrid cloud (14 %). According to the respondents coming from the organizations using cloud technology main reasons for cloud technology usage in their business activity are: increase of business agility (36 %), safety copies (30 %) and savings (29 %). Most of companies from the sample (55 %) are conducting software integration independently in their company while 18 % are relying on their software suppliers; 14 % of companies are using service providers as third party for software integration. Decisions on procurement of new software are brought by teams within company consisting mainly of employees belonging corporate management, storage, distribution, logistics and procurement. The most important factors that influence new software procurement in logistics business sector are: compatibility with existing systems, adaptability, service and support, adequate options for certain functions, suppliers' financial stability and installation simplicity (Perpetuum Mobile, 2014).

4 Future of the cloud technology in supply chains

The most common problems occurring related to cloud technology usage in organizations are data safety and privacy problems. Often there are also problems related to age of business systems, system availability and lack of adjustment. Access to data in the cloud should be available only to members with permission, i.e. only members in the supply chain that enjoy highest trust. Unfortunately cloud systems as software product cannot always insure reliability and as therefore the risk of hacking is often present. The data hacked by other companies may impose a direct threat to the whole supply chain (Toka et al., 2013). Companies using cloud technology are often concerned on potential consequences when sudden system crash occurs because processes in the supply chain have direct impact on financial stability of the company and delays due to cloud system crash may cause significant consequences. At the same time users may have problems accessing the cloud due to bad Internet connectivity in different geographical areas.

Cloud technology has potential to create value in organizational supply chain. At the same time, it is of great importance to recognize how centrifugal forces are pushing the information technology through business activity in the whole. Organizations are increasingly starting to use cloud solutions for certain activities like net cooperation, administrative support, transport and logistics management. In the future more key technologies that shall enable more innovation in supply chain management, big and fast databases and analytics and Product Lifecycle Management (PLM) solutions are expected. Kasemsap (2015) argues that for contemporary organizations that are conducting their business activity on very potential markets, the quest for new sources of competitive advantage is necessary in order to keep it in the time of the social media age. It is

expected that applications developed in the cloud computing shall change the PLM market in the short term especially as bigger business support and in improving collection and data analysis on buyers. New generation of applications and real time data platform are penetrating the market. Data analysis that previously required hours of work will now on be available in a few seconds due to new in-memory databases. It is expected that basic analytics in supply chain will be moved into tactical analytics departments and that deeper insight into supply chain management will be enabled.

5 Conclusion

Nowadays adequate decision making is the basis for quality business activities in organizations. This process, as also the organization of people and their working activities, is simplified in case the organization is using certain type of business logistic and quality information system. One of latest and mostly developed system is cloud technology, a concept enabling networking of individuals into the system and availability of information, records, documentation and programs into the cloud. Vemula and Zsifkovits (2016) state that cloud computing is one of the most significant trends in IT industry, while according to Bhoir and Principal (2014) the value of the cloud computing lies in the fact that it is the right technology for support and management in constantly changing and dynamic net and also for supply chain management. Cloud is accessible at any time and from any location connected to the Internet and this way decision making and business activity in general are improved. Efficient supply chains are of extreme importance for many enterprises. Supply chain management has effect on operational processes, divergent and consolidated information flow and interaction processes with different business partners.

The evolution of cloud technology influences organizations and their supply chains on several ways, one of which is competitive advantage enabling start-up organizations insurance of their positioning on the market in very short term and without significant investment in infrastructure. Increase in products and services that are achieving high profits is leading to big pressure in supply chains because organizations have to launch their products and services quickly onto the market and cloud technology is of great usage in this field. Increased flow of new products and services is forcing organizations to renew their infrastructure and traditional supply chains what makes them more dynamic, scalable and supportive towards financial goals of organization. Implementation of the cloud technology in enterprises is not an easy task and therefore different tools are prerequisites for its adequate implementation with the minimum risks for the enterprise. Enterprises must use efficient decision models, risk assessment models and risk optimization models that will enable decision makers in determination of optimum investment in safety with the aim of reducing mistake costs.

As for usage of cloud technology in supply chains in Croatia, there are only a few companies using cloud technology in their business activities and most often in the field of communication and manufacture. Most common reasons for mistrust in the cloud technology include safety and data privacy which is understandable when having in mind number of participants in the supply chain that are all connected in one digital net in which important and confidential data are shared. This data availability contributes to competitive advantage by enabling quick access to information and decision making. On the other hand, certain level of safety and confidentiality may be achieved by allowing only employees with permission to access data in the cloud. Companies using cloud technology in their business activities are perceiving also financial benefits due to improved competitiveness achieved by quick reaction on consumer needs and transparent and efficient business processes. Finally, decision makers in the supply chain may use risk assessment models in order to identify risks and companies have to use risk optimization models in order to determine optimum investment and decrease mistake costs.

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