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The Impact of Setting up a Cloud Computing Solution on Small and Medium Organization's Management: A Qualitative Study

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Abstract

As we know, organizations are systems that affect their surrounding environment and get involved with their environment. Any changes can impact the outcome of any operation and decision in the organization, no matter how small it is or how irrelevant, from the most straightforward operation or process to the most complicated functions and strategic decisions. Migrating to cloud computing is one of the most important enterprise goals. This technology impacts the use of information and communication profoundly. Its main goal is to provide data storage and net computing services that are secure, rapid, and convenient. In this sense, the small and medium enterprise is the most interested since initial investments are avoided, and the technology allows gradual implementation. The present study aims to introduce the advantages of implementing cloud computing in small and medium enterprises. This paper studies cloud computing and its impact on the organization, which was carried out using a qualitative methodology to show the elements that may get impacted the most and the consequences of its adoption. By interviewing 13 managers and experts from four small and medium companies. Qualitative content analysis and open coding were used to analyze the data. Subsequently, five sub-themes were extracted from the central theme of the impact of cloud implementation on operational management in organizations. The sub-themes included information access, communication, collaborative work, and customer and supplier relationships. We found out that migrating into the cloud for organizations is primarily beneficial, with some exceptions, of course, any system or any technology has flaws, but in the case of the cloud technology, the benefits are more cover the flaws, especially if the implementation was well planned and well maintained, and we provide all the conditions needed for the good functioning of this technology.

Keywords: Collaborative Work, Communication, Costumer Relationship, Information Access, Supplier Relationship.

JEL Classification: M10, M15, M19.

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Introduction

Whatever their activity fields, organizations continuously produce vast amounts of data every day. Organizations always use information technologies to serve their customers better, make life easier for employees, improve the work environment, treat the suppliers better, make their job easier, etc., making IT departments very sensitive. As a result of decades of evolutions in the Tech world, organizations trying to open up to the world through the web, a new concept appeared and became known as "Cloud computing". Cloud computing is becoming more important, and it is gaining traction in the scientific and industrial communities. Throughout the years, organizations have experienced and will continue to experience in information and communication technologies several opportunities, cloud computing will have a direct impact on their most valuable asset, information (Otero, Otero, Qureshi, 2010). Enterprises are beginning to explore cloud computing technology as a way of reducing costs and increasing profitability; this paper

discusses the impact on the organization after adopting cloud computing, we will try to clarify cloud computing advantages on daily management.

Cloud Computing Actual Context. Cloud computing has emerged as a new IT paradigm. Since its appearance, many companies worldwide and in Algeria are migrating into it, and many cloud computing service providers are in markets now. According to a Gartner study, Cloud Computing is the first among the top ten most essential technologies, promising for businesses in the coming years. The cloud improves collaboration, agility, scalability, availability, the ability to adapt to fluctuations in demand, speeds up development work and has the potential to reduce costs through optimized and efficient computing. Although there is no general definition of cloud computing, one of the most used and comprehensive definitions available is by Brendl (2010), who defined cloud computing as "collections of IT resources (servers, databases, and applications) which are available on an on-demand basis, provided by a service company, available through the internet, and provide resource pooling among multiple users".

Defining cloud computing depends on the angle we're looking from because the definition changes with the change of perspective. According to John W. Rittinghouse, James F. Ransome *(*2010), the term cloud has been used as a metaphor for the internet. We can say that Cloud computing uses computing power on the internet. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper (2010) gave a more technical definition. "The cloud is a collection of hardware, networks, storage, services, and interfaces that enable the delivery of computing as a service; cloud services include the delivery of software, infrastructure, and storage via the internet". We can also say that the definition itself may vary from the final user of the cloud computing to the provider. We can take, for instance, the definition of Merill Lynch, who is an end-user "The idea of delivering personal (e.g., email, word processing, presentations) and business applications (e.g., sales force automation, customer services, accounting.) From centralized servers". On the other side, we have Amazon's well-known provider definition "Cloud computing is the on-demand delivery of computing power, database, storage, applications, and other IT resources through a cloud service Platform via the internet with a pay-as-you-go pricing".

Cloud Computing Advantages on Organization. The business environment is changing with cloud technology in the markets. It allows collaborative work within the company and its parts; besides that, cloud providers provide administrators with controls to manage which applications their users can access and how employees can use each service. It allows collaborative work between companies in the industry, thus creating a pool of aggregated and cumulated expertise, good business practices, experiences, and ways to get tasks done. The cloud allows for a great deal of flexibility and control. However, moving to the cloud does not imply that businesses lose control of their data or technology. Open-source software are now used in every scale of the cloud hierarchy, and it's becoming as core to cloud as it has been for web services, and it plays a significant role in managing VMs.

Cloud providers use open-source software to manage their cloud. As a result, cloud computing is the most cost-effective method to operate, maintain, and upgrade. According to Traditional desktop software, it costs companies a lot in finance. For example, here in Algeria, we know that Mobilis and Actel use an open-source solution, Open Stack. The role of this solution is to build and manage the cloud. The Algerian oil company Naftal created a cloud based on a VMware solution; we also have NASA's solution Rackspace which Amazon later used. Cloud computing can manage if a company anticipates a considerable upswing in computing needs. Instead of buying and configuring new storage, cloud computing provides additional storage from a third party. The installation of cloud computing is very simple. It helps the start of the application immediately and it costs a fraction to implement it. Cloud computing provides the user with the required storage. Moreover, cloud computing gives freedom of storing data by the user anytime. Only it needs the internet connections. The ability to manage risk more effectively from a centralized point is the strength of cloud computing in information risk management. Security patches and updates can be applied more effectively, allowing for business continuity in the event of a security breach.

Case Study

To accomplish this research, we studied the case of four companies; the first one is the hosting company (Integrator Open Source). We could not review this topic objectively because IOS is a cloud solutions and services provider; that is why we needed access to three of their clients, which we'll call alpha, beta and theta company that buy cloud services from IOS. Even though IOS was a cloud provider, it was not excluded from the research, because they used a lot of cloud, based solutions and applications. The current study used a qualitative approach and in-depth interviews to identify factors influencing cloud use in operational

management. Because cloud computing is a new phenomenon in Algerian small businesses, qualitative methodology is the most appropriate approach for gaining a thorough understanding of the issue. Between January and July of this year, 13 people were interviewed. All research participants use cloud computing in their daily operations, each one of them had a purpose, and each one of them studied the side of the issue and gave a different perspective.

Presentation of the Company (Integrator Open Source). The company Integrator Open Source was created in 2012, with the ambition to participate with IT companies, with high technical content in innovative fields, in markets with increased development. Then IOS is a service provider in the IT sector, under an IT consulting company that also offers services of setting up advanced networks and data treatment. In the development of IOS, the company projects in the future that they will be engaging in many steps of a resources modernization plan to ensure its sustainability and its competitive strengths in this emerging market in Algeria.

Table 1. The Ios Clients Companies' Presentation

	Alpha Company	**Beta Company**	**Theta Company**
Creation date	April 2013	March 2017	February 2000
Legal form	SARL	SARL	SARL
Social capital	800000 DA	400000 DA	1000000 DA
Workforce	22	7	45
Principal activity	Training market	Distribution market	Employment market
Market	Algeria	Algeria	Algeria

Source: Compiled by the authors

Data Collection and Analysis

The present study was conducted qualitatively and via in-depth interviews to identify factors impacting organizations management. The interviews were conducted using an interview guide, including six open questions based on the literature review. During the interviews, these questions were used to collect the necessary information; the subject was attempted to be developed to gather more information related to the questions. The interviews lasted an average of 20 minutes and were conducted face-to-face.

The interviewees of the alpha, beta, and theta companies were contacted before the interviews via emails from the hosting company IOS, which provided them with general explanations and the purpose of the interview. Then, in collaboration with the interviewees, we visited them at their workplace. We conducted the first four interviews with the manager and three consultants of the company IOS to give us the provider's perspective and the technical aspects. Then, we moved toward IOS clients to provide us with the customer's perspective and insight into how cloud impact when used in a work environment; we had interviews with the manager and two seniors' executives of each one of them. The texts were carefully examined and implemented in Word 2013 software. The implemented texts were thoroughly examined to analyze data using the qualitative content analysis method, and an open encoding approach was used to achieve primary concepts extracted from the interview texts. Following that, axial coding was used to establish communication between extracted concepts.

Results

Table 2. Characteristics of Respondents

Number	**Code**	**Work Experience**	**Workplace**
1	I1	13	IOS manager
2	I2	13	IOS Consultant
3	I3	10	IOS Consultant
4	I4	10	IOS Consultant
5	A1	15	Alpha manager
6	A2	8	Alpha senior
7	A3	6	Alpha senior
8	B1	4	Beta manager
9	B2	4	Beta senior
10	B3	3	Beta senior
11	C1	14	Theta manager
12	C2	10	Theta senior
13	C3	8	Theta senior

Source: Compiled by the authors

The analysis results of respondents' opinions are presented in five sub-themes of access to information, communication, collaborative work, customer relationship, and supplier relationship. Each one of them has between two and four categories. These categories were extracted based on the interviews.

Table 3. Results

Sub-theme	Categories	Frequency
Access to information	The use of these applications as time saving	I1.12.13.I4.A1.A2.B1.C1.C2
	Access to information is easy and secured	I1.12.13.I4.A1.B1.B2.C1.C2.C3
	Connectivity issues	A3.B1.B2.B3.C1.C2.C3
Communication	Being connected all the time with what's happening in the company	I1.12.13.I4.A1..B1.B2..C1.C2.
	Help you before better deal with an emergency	I1.12.I4.A1.A2. B1.B2.B3.
Collaborative work	Allows to see real-time changes in the database's information	I1.12.13.I4.A1.A2.A3.B1.C1.
	Upgrading storage capacity	I1.12.13.I4.A1.A2.A3.B1.B2.B3.C1.C2.C3
	The feature of multiple copy of data in cloud mode (redundancy)	I4..A2.A3.B2.B3. C3
Costumer relationship	The focus of the organization on key processes	I1.12.13.I4.A1.A2.A3. B3.C1.C2.
	Accelerating offers responds	I1.12.A2. C1.C2.
	No need for full-time specialists in the company	12.B1.B2.B3.C1.C2.C3
	Expecting to increase the quality of services using the cloud	I1.12.13.I4.A1..B1.C1.
Supplier relationship	Cost reduction as an economic benefit of cloud	I1.12.13.I4.B1.B2.B3.C1.C2.C3
	Upgrading the identification and supplier problems management in the cloud	I1.12.13.I4. B1.C1

Source: Compiled by the authors

Discussion

We finally arrived at the end of this research, where we will see the result we got from this whole study, combining all the parts we saw and all the experiences and observations we got from the field. Adding the interviews will give us a somewhat clear image of the impact of cloud computing technology on the organization.

The Impact of Cloud Computing on Information Access. We can say that access to information was the most impacted by the cloud because of its centralized server system. In the cloud, the system is a centralized, server connected to the users with a network (usually it is the internet), and this same network connects them, and everyone has access to the system (within the limits of his authorization) meaning everyone has access to the information everywhere an anytime.

On the downside, the network connecting the organization and the servers (especially if we are talking about the public cloud) is usually the internet. If an employee is in a location with no internet, he will have no access to the servers or the information. But looking at how the world is now, it is rare to find a place where there is no internet coverage, as it was made clear to us in one of the interviews "…now we even have the internet on planes…", here in Algeria and many other 3rd world countries yes there are still places where there is no coverage, but it is getting better day after day.

Impact of Cloud Computing on Communication. On the downside, the network connecting the organization and the servers (especially if we are talking about the public cloud) is usually the internet. If an employee is in a location with no internet, he will have no access to the servers or the information. But looking at how the world is now, it is rare to find a place where there is no internet coverage, as it was made clear to us in one of the interviews "…now we even have the internet on planes…", here in Algeria and many other 3rd world countries yes there are still places where there is no coverage, but it is getting better day after day.

File/information exchange was made much more responsive thanks to cloud applications. One example of that is cloud applications, instead of physically moving and using a device such as a flash drive to get a file from one computer to other or taking the time to send it via email. Using cloud applications, everyone who has the authorization to access the organization's cloud applications account can have the file immediately after creating it and see real-time changes. All communications from upper management to the employees or the other way around cannot go unnoticed on organizations social media applications such as slack.

Impact on Collaborative Work. The impact on collaborative work can be somewhat similar to communication, but with some differences. Using cloud applications, when an employee works on a file

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containing client's information, if said employee makes any mistakes, anyone who has access can detect the error and either correct it or alert them of the error.

Impact on Customer Relationship. Even though using cloud computing did not affect customer relationships, some of the impacts changed how the organization deals with its customers. The effect on communication involved customer relationships; by communicating better inside the company, information moves faster, which allows being more responsive to client inquiries. Also, better communication inside the company makes every project well understood by everyone, resulting in a better quality of the offer they give to the customer. By doing collaborative work as well as It should be, let's say in a project that uses a management tool like Trello, where everyone knows what they are doing, the organization will have better quality products delivered. Because of the centralized servers in cloud computing, everyone in the company have access to customer's information everywhere, anytime.

Impact on Supplier Relationship. The impact of the cloud was not directed on customer relationships too. As we saw in the interview, it was hard to come up with an immediate impact, but we saw the example of payments made on time by cloud-based applications, which is one impact of the cloud. In the case of the alpha company, if we consider the trainer as supplier since the product is training program, we see that using applications such as Open Project, the trainer can be punctual with the company and its clients; they can have all the information needed to deliver their product easily using this application.

Conclusion

Today, most organizations use cloud applications without even knowing they are on the cloud. Even more, most people already use cloud computing technology in their daily lives without realizing it. That is because applications such as Google Drive, Google sheet, Gmail are all cloud-based applications. Still, of course, the other part of the cloud requires resources to set up, such as a project in the organization to create its private cloud, and in this research, we studied both. We saw that cloud technology when implemented and adopted in an organization; it impacts mainly every part of it, whether these impacts are direct or indirect, and of course, there is the part that was affected more than others, for example, the information security, access to information, collaborative work, and communication were impacted more than any other part.

We found out that migrating into the cloud for organizations worldwide is beneficial, with some exceptions; of course, any system or technology has flaws. Still, in the case of cloud technology, the benefits are more cover the flaws, especially if the implementation was well planned and well maintained and if we provide all the conditions needed for the good functioning of this technology. Speaking about the conditions for the excellent functioning of the technology, we are going to talk about these conditions in Algeria; these conditions here are less available than in the rest of the world, which makes the downside of this technology here more significant than the downside in the rest of the world, cause if we look at what are these conditions, we can pick out of the top of our minds, the legal status of the technology and the internet coverage, the legal position here is still unclear, and lawmakers do not seem interested in regulating it any time soon, and there are still some places here with bad internet coverage and bad cell reception which as we saw can be in obstacle in the way of the good functioning of this technology, nonetheless we still think that migrating into the cloud would be a good decision for an Algerian organization, because even though the downside is more significant than in the rest of the world, but its good side is bigger.

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