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A cloud computing adoption in Indian SMEs: Scale development and validation approach

Pragati Priyadarshinee[a], Rakesh D. Raut[b,*], Manoj Kumar Jha[c], Sachin S. Kamble[b]

[a] Room No. 342, Hostel No. 3, National Institute of Industrial Engineering (NITIE), Vihar Lake, Mumbai 400087, India
[b] Operations and Supply Chain Management, Room No. 515, ALB Building, 5th Floor, National Institute of Industrial Engineering (NITIE), Vihar Lake, Mumbai 87, India
[c] Marketing Management, National Institute of Industrial Engineering (NITIE), Mumbai 87, India

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ABSTRACT

The purpose of this research article is to identify the critical success criteria/factors that affect the cloud computing adoption and examine structure, reliability and validity of the criteria in the SMEs industry. This study considers nine types of criteria/factors with fifty-one sub-criteria, which have somewhat previously been used, and creates a ranking model that offers decision makers to measure the prior implementation of cloud computing adoption. A questionnaire-based survey research was used to collect data from 110 firms belonging to the SMEs industry in India. In this paper, the data collected was analysed by an integrated approach. Firstly, an Analytic Hierarchy Process approach was applied to find the significant fact of each criterion as the assessable indices of the cloud computing adoption. Secondly, an Exploratory Factor Analysis and Confirmatory Factor Analysis were used to examine structure, reliability and validity of the criteria. The data was tabulated in a Microsoft Excel sheet and then imported in SPSS (Statistical Package for the Social Sciences version 20) for analysis. The findings discovered that 'Security and Privacy', 'Organizational Risk', 'Sharing and Collaboration', 'Confidentiality', and 'Integrity' have a major effect on the adoption of cloud computing. The research was conducted in the SMEs industry in India, which may limit the generalizability of the findings. The findings and recommendations offer cloud computing service providers as well as users with a better understanding of what affects the cloud computing adoption feature, with a relevant understanding of the current scenario. The research aided in the application of the new technology of cloud computing adoption in the SMEs industry in India through the use of a wide range of criteria. The findings also help organizations study their information technology investments when applying cloud computing.

1. Introduction

Cloud computing is intended to serve the businesses by growing the performance, reducing the cost, increasing the storage capacity and easy accessibility worldwide. This can be useful for most of the small and medium enterprises (SMEs) in the initial stage of business development. Even if this type of computing systems has been in the online domain and useful to numerous services in western countries for many years, the idea of cloud computing is quite new to many developing countries comprising India in which there are evolving businesses basically desire for reduced costs of creation and proficient developments (Keesookpun & Mitomo,

* Corresponding author.
E-mail address: rraut@nitie.ac.in (R.D. Raut).

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Size and structure of SMEs make them face many challenges. The main challenge is not having access to enough resources (e.g. financial resources). Moreover, in comparison to large companies, small firms have less tolerance in bearing cost and risk of adopting innovations (Malecki, 1977). SMEs are very cost conscious; they should keep their costs under control. Although adopting new technologies help SMEs gain competitive advantage, it usually involves high cost. Fixed costs, operation costs, and training costs are different types of costs that are usually parts of any IT investment. On the other hand, in many cases, the actual cost of the project becomes higher than the initial estimate (Jorgensen & Molokken-ostvold, 2006; Whittaker, 1999). The high costs and risks that are involved in IT projects prevent SMEs to invest in or adopt new technologies easily. In general, SMEs are small in size and hence not so well structured. SMEs might have a formal IT department, but still, most of them do not have a formal Risk Management practice.

Cloud computing is a novel theoretical example for business which combines into a distinct environment not only applications, architecture and business models but a multiplicity of professionals for the performance of corporate business jobs in the internet standard (Budrienė & Zalieckaitė, 2012). With the expansion of novel IT and web technologies, cloud computing appears in current years as a solution to this IT problem. Cloud computing is an unconventional IT model to host and share both software and hardware assets over the Internet. It approves businesses to practice a group of IT resources and applications as services essentially through the web, without substantially holding these computing assets within (Dutta, Peng, & Choudhary, 2013). Additionally, there are macroeconomic benefits from the cloud. Indeed, the cost reduction feature of the cloud computing model results in the higher possibility of business creation, specifically SMEs, which then hints to higher employment and production for the country (Keesookpun & Mitomo, 2012). Cloud computing is a paradigm shift which needs to understand how to adopt the technology. It is important to understand companies' perceptions of Cloud computing and technology adoption because it can be used to determine the criteria/factors those are likely to influence the performance of business.

The most significant thing is not about whether to adopt an innovative technology or not, it is rather connected to when the decision should be taken at an initial step or later on. The purpose after this is about the association between the streams of profits found through the complete life of the adopted improvement and the unrecoverable costs usually experienced at the instant of adoption (Alvarez, 2011). When considering enterprise adoption, the utmost significant distinction of cloud technology is that it deals a bigger collection of adoption strategies than several prior enterprise resolutions such as ERP, SCM, and CRM. Therefore, to be economical in the present business domain, several companies want to use Cloud technologies to increase their performance. Several micro businesses and SMEs are still sitting on the boundary and are planning whether to move to or not to move to the cloud computing trend (Gupta, Seetharaman, & Raj, 2013).

The benefits of cloud computing over traditional computing contain scalability, lower entry cost, location independency, device independency, and agility. Because of the benefits, many cloud service providers developed and customers are growing their adoptions. Under these circumstances, a quality of cloud computing services can be a guideline for users to select a cloud service and for providers to decide a criteria/factor which they focus on to improve their services (Choi & Song, 2012). The purpose of the empirical study, the determinants of cloud computing adoption over the conceptual framework, which has been widely used to describe enterprise IT adoption, and inquire whether it can correctly describe not only adoption decisions but also the modalities of adoption accessible by cloud stages. Thus, we could recognize which factors can affect companies' business performance when choosing/considering cloud services from adopters' aspect and which factors will affect businesses choice of cloud deployment models (Hsu, Ray, & Li-Hsieh, 2014).

The purpose of the present study is to propose a framework for understanding the impact of cloud computing adoption on business performance. Analytic Hierarchy Process is useful to find the significance degree of each criterion as the measurable indices of the cloud computing adoption and an Exploratory Factor Analysis and Confirmatory Factor Analysis are used to examine structure, reliability and validity of the criteria. This paper is prepared as follows: a literature review on cloud computing in Section 2, the problem description is in Section 3, research methodology is explained in Section 4, influenced critical success criteria are discussed in the results and discussion in Section 5. Conclusions are drawn in the final Section 6.

2. Literature review

The main purpose of the literature review is to understand the notable work done previously in the area of cloud computing adoption and its usability challenges in the world as well as in India. It also projects the intention to adopt cloud computing and its various advantages for Industry. The literature also covers various topics related to cloud adoption and its business implications in various domains, especially in Indian organizations. Opportunities and challenges are emerging for cloud providers, technology adopters, and industries from the increasing availability of low-cost cloud computing solutions. While studying cloud computing adoption, research papers were categorized into the basic concepts of cloud computing, world studies, and studies with Indian context.

2.1. Phases of paradigms

The Internet is a network of networks, which provides software/hardware infrastructure to establish and maintain connectivity of the computers around the world, while Cloud Computing is a novel technology that delivers many types of resources over the Internet. Therefore, Cloud Computing could be identified as a technology that uses the Internet as the communication medium to deliver its services. Cloud services can be offered within enterprises through LANs on the Internet. There are six stages of computing paradigms, from mainframe computing to PC computing to network computing to internet computing to grid computing to cloud