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What Role does Corporate Governance Play in the Intention to Use Cloud Computing Technology?

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Abstract: This paper aims to investigate the factors which promote the adoption of cloud-based technology. It strives for a better understanding of the impact of corporate governance on the adoption of this technology. This study concentrated on executives in companies where the use of cloud computing may give a competitive advantage. The main contribution of this work is to propose a model for the influence of corporate governance and other factors that determine the adoption of this technology. A questionnaire was prepared after taking into consideration the reviewed literature. The sample consisted of 164 technology companies from Southern Spain that already use the new economic models for digital solutions. The methodology used to analyze the structural model was the Structural Equation Model (SEM). The results of the survey showed the influence of Corporate Governance and the procedures and practices of the organization on the adoption of cloud computing and the associated business model. This study aims to point out the importance of corporate support and Knowledge Management for the correct and successful adoption of this technology and to show the effects on the new business model of billing for the use of available resources.

Keywords: cloud computing; corporate governance; technology adoption; PLS-SEM

1. Introduction

The emergence of cloud computing technology has led to major changes in the activities of companies in the Information Technology (IT) sector. This has resulted in an impact on the management of corporate governance and its performance in technology companies. The concept of corporate governance refers to the set of principles and rules that govern the design, integration and operation of the governing bodies of the company, such as: Shareholders, Board of Directors and Senior Management [1].

This concept, applied to cloud computing technology with the SaaS model offers software as a service and implies a new management model in which the different members of the governing bodies see the need for interpersonal interaction to be reduced. Likewise, the use of “cloud computing” technology gives rise to other forms of income generation for technology companies, allowing them to transform from a business model based on sales of software or hardware products, to a model of service provider based on use, time or resources [2].

From the review of existing literature [2–5], key factors were identified for the adoption of this paradigm from the perspective of corporate governance. Thus, the training of staff, the support of senior

management, the degree of implementation of corporate governance, and internal communication between governing bodies seem to play a relevant role in the intention to use technology.

Sareen [4] understands that the relevance of the implementation of “cloud computing” affects the entire organization and recommends observing the process of good IT governance companywide. This idea leads to the corporate governance of information technologies (CGIT) as a subset of corporate governance. CGIT is defined as the responsibility of the board of directors and the management in the leadership of the organizational structures and processes that ensure that the IT in the organization sustains and extends the organization’s strategies and objectives [6]. CGIT focuses on a strategic approach for improving the performance of the organization and maximizing the value of IT [7] and especially on maximizing the results of investment in IT to achieve the objectives and increase the value of the business [8].

There little research carried out into organizations’ opinions about using CGIT to achieve this goal and also the policies, practices, frameworks, and methodologies related to it [8]. This research increases the literature in this field of study and aims to analyze the consequences of corporate governance policies on the adoption of cloud computing and, in particular, how the effects of corporate governance are interrelated with the effects of other influencing factors.

The main contribution of this research is to identify factors that help the adoption of cloud computing in organizations which have codes of good governance. Consequently, this research shows how different factors related to corporate governance influence the adoption of cloud computing within the paradigm that implies changing both the technological and economic models of these organizations.

In order to achieve the proposed objective and corroborate the working hypotheses, structural equation modelling (SEM) was used with partial least squares (PLS). A questionnaire was prepared after taking into consideration the reviewed literature. The data was obtained and statistically validated from the answers provided by 164 technology companies from the south of Spain that answered a questionnaire.

This study aims to help managers formulate and implement effective strategies to align and integrate technology, operations, strategies, structures, culture, and human resources in corporate governance of IT. Another aim is to show the importance of corporate support and the involvement of knowledge management for the correct adoption of this technology, and the effects of the new business model of billing for the use of available resources.

The conclusions are intended to be of great value for corporate governance and the migration to a new model of income generation not based on licenses, but on use and availability. It is hoped that these findings will contribute to a better understanding of the relevant factors that are involved in governance and IT management in technology companies. To do so, Section 2 undertakes a thorough review of the adoption literature. Section 3 details the conceptual framework and hypothesis elaboration, resulting in a survey of companies. On the one hand, by reviewing the Cloud Computing adoption literature to locate the main factors influencing adoption and, on the other hand, with the survey, we have been able to construct an adoption model that the influence of Corporate Governance and the procedures and practices of the organization on cloud computing adoption and the associated business model. Section 4 details the characteristics of the sample and the questionnaire used. Section 5 presents the analysis of the results, and Sections 6 and 7 summarize the discussion and conclusions.

2. Theoretical Background

The code of good corporate governance tries to guide correct decision-making for the prediction of business performance and the responsibilities of the different actors that intervene. In its most basic form, good governance rules apply to policies for the use of services, as well as defining the organizational principles and rules that determine how an organization should behave.

IT governance ensures (1) that IT assets (systems, processes, etc.) are implemented and used in accordance with the agreed policies and procedures; (2) that these assets are properly controlled and maintained; and (3) that those assets add value to the organization while truly supporting

the organization's business strategy and objectives. Consequently, IT governance should include techniques and policies that measure and control how these systems are managed. However, IT is not alone in governance processes. For governance to be effective, it should be holistic. It should include organizational issues and how people work together to achieve business objectives and any technology used to achieve these. Therefore, the best form of governance arises when IT and business work together [4].

A fundamental issue for corporate governance is the creation of organizational relationships between business and IT, as well as the definition of the framework for how people work together across the organization. The usual operation of IT corporate governance involves forming a committee composed of representatives from both the business and IT areas. Its function is to create rules and define processes that the organization must follow to ensure that policies are met. The reason for this could be issues such as (1) understanding business problems, such as regulatory requirements or financing needs; (2) the definition of best practices and the follow up of these processes; and (3) responsibility for the technical aspects of IT, such as programming standards, appropriate design, review, certification, and monitoring of applications [4].

Various recent studies have investigated cases of cloud computing and the associated continued business potential of companies [9], value creation for corporate growth [10], the traditional accounting industry, organizational flexibility [11], cost and profit [12], legal visibility [13], and strategic alliance drivers [14].

2.1. The "Cloud Computing" Paradigm

A generally accepted definition of cloud computing is provided by the National Institute for Standards and Technology [15]: The cloud is a model that allows ubiquitous access in a convenient, configurable way by request to the network. Thus, cloud computing is a change of the business paradigm, since it is no longer necessary to have servers, hardware and software in company offices, and processes are performed by accessing the Internet [2]. All this on demand, in a dynamic and scalable way in which the needs for resources can increase or decrease depending on business needs.

Instant access to corporate resources, anytime and anywhere, dominates contemporary discourse on transformations in business systems [7].

Cloud computing has become an important research topic. The solutions it offers are attractive options for companies that want to improve their IT infrastructure in some aspects, but lack financing funds for IT assets. Benefits, such as agility, collaboration, economies of scale, and availability, coupled with opportunities for cost reduction by optimization and information efficiency, attract many suppliers and, especially, potential customers [7]. These benefits are associated with the opportunity for computer information needs (e.g., networks, servers, storage, applications and services) to be provided and quickly satisfied at the customer's request with a minimum of management effort or contact with the provider [15,16].

Therefore, for organizations, it means being able to use new software and IT infrastructure services on the fly, without having to pay software licenses or acquiring hardware and have it installed in the offices. Hence, the existence of a paradigm, since this drastically reduces the cost of implementing applications [17] and gives a set of advantages to companies: outsourcing, cost savings, quality improvement, and access to specialized support [18]. Many traditional software vendors that sell software packs (for example, ERP, CRM, office automation, productivity software, etc.) might seem to lose out from this as they do not sell licenses or packages any more. However, they are learning how to evolve and nowadays apply tariffs for the use of those same applications with cloud computing, offering complementary services such as backups or storage in the cloud and all with a large number of possible adaptations [19].

Companies that use cloud technology can adapt better to market changes, because they can access the necessary cloud resources on demand, without needing large technological infrastructures and can

also manage these resources anywhere, at any time, hiding the complexities of the basic infrastructure from end users [20].

The cloud computing business model also has inhibitors that could stop users from adopting services in the cloud. The strongest barrier to this technological innovation is the integrity of data, which refers to the protection of data against unauthorized access, disclosure, modification or destruction while stored, processed or transferred within the “cloud computing” system, or the loss or theft of data [21–23]. The lack of reliability [24,25] and the lack of standardization [26,27] are other notable barriers.

2.2. The Need for It Governance Strategies

The information systems field is undergoing a paradigm shift, with cloud computing significantly changing business models and processes, not only for enterprises who are the information systems end users, but also for contractors and providers of information systems development services [28].

Migration from traditional information system structures to cloud computing can lead to cost savings and the resulting improvements in efficiency can generate stronger corporate growth and external networks. All this finally contributes to the creation of value for corporate growth. In this way, corporate governance applied to the improvement in IT capacity for the creation of commercial value, is implemented in tools and management systems related to CGIT good practice. These include PRINCE2 (Projects in controlled environments), ITIL (IT infrastructure library), COBIT2 (Control objectives for information and related technology), Val IT (value of IT investments), and ISO/IEC 38500: 2008 (international quality standard).

The application of codes of good corporate governance implies the availability of transparent information that can contribute to efficient corporate governance, also rooted in the improvement of relations between the entity and all the interested parties. Thus, a system that can be securely accessed by users with the correct permissions and profiles, and above all, with complete accessibility, is a necessary base for these codes. Since related regulations have come into force, there has been an exponential increase in the demand for information from investors, financiers and financial analysts [7].

In practice, migrating to cloud computing requires a good governance strategy and good governance technology [29]. A governance function in “cloud computing” requires active management participation, an appropriate forum for making IT-related decisions, and effective internal communication between the IT organization and the company’s management team [30]. The company must plan and understand cloud security, carefully analyze the inherent security risks, and plan ways to address them before implementing the technology. This means that the human resources of the organization must be trained. This training, together with good governance to effectively address problems and concerns about security and privacy, must be planned and take place over a period of time [31].

One of the most common situations where cloud computing technology is implemented in organizations is for the outsourcing of the service. An important consideration when moving to an outsourced cloud environment is that a company negotiates the risk balance between customers and suppliers, between data controllers and data processors, and ensures that services are aligned to ensure the correct operation of the organization [32].

3. Conceptual Framework and Hypothesis Elaboration

3.1. Knowledge Management (KM)

In the last decades, a widespread recognition of knowledge within companies has become a strategic asset [33] for creating a competitive advantage in modern organizations [34]. The management team appreciates the importance of knowledge and consistently invests in its development [35]. The successful implementation of knowledge management is based on five

factors: knowledge creation, transfer, utilization, managerial leadership supports, and application of technology [36].

The incorporation of technological advances in Information Technology (IT) [37] have been important for companies. The use of new technologies has decisively enhanced the efficiency of organizational management [38]. Knowledge Management (KM) has allowed companies to cope with large amounts of information and operations. This requires the use of core activities for the KM framework such as classifying information, monitoring operations and storing big data [39].

Internal systems need to be organized in the correct manner, so that the data can be efficiently found and reported to the stakeholders with a reduction in errors by users and executives [40].

Since cloud computing appeared in 2008, it has attracted a large amount of attention from executives, consultants, enterprises, and technology analysts, etc.

Cloud computing has emerged as the most important future trend in the IT industry [41]. This advanced tool provides ICT services such as virtual hardware provided by data centers or club vendors [42] operated by cloud suppliers which offer private networks [43].

The large amounts of complex and diverse information can cause difficulties when managing companies [41], such as the high price of equipment and the intensive labor needed to handle the information and create and implement processes to update the information [41].

Cloud computing combines computers with online services to provide a wide range of services for efficient knowledge management so that companies can compete in a rapidly changing market by reducing operational costs and taking advantage of new operational models that use strategic data in decision making [44].

Knowledge management not only channels the required corporate information but also provides strategic data for making decisions on the action to be taken for any external environmental changes and deciding on efficient countermeasures to periodically reinvent the company [45].

Knowledge Management provides a large amount of significant data which can make a positive impact on organizations with the use involvement of cloud technology [42]. Cloud computing initially turns data into accessible information, then into knowledge, and lastly into wise methodologies for “learning by doing” which improve the worker’s potential and innovative skills by integrating failures [46].

Knowledge management allows the innovative features of cloud computing [47] to be combined with the organizational environment in companies [48].

Managers must use the technological innovations in the organization [47] by periodically assessing the technology systems to improve the management processes for innovative services [48]. The following hypotheses were therefore formulated:

Hypothesis 1 (H1): *Knowledge management has a positive effect on the intention to use cloud computing systems.*

Hypothesis 2 (H2): *Knowledge management has a positive effect on internal communication about the use of cloud computing.*

3.2. Training and e-Learning (TE)

Introducing new technologies in an organization is by no means easy and poses many challenges, such as the acceptance and adoption of new technologies by employees [49]. It has been shown that appropriate management actions, such as providing training and education, and organizational support, influence the successful individual use of innovation [50]. Training is useful for the correct adoption of cloud computing in an organization [51]. The amount of use of a system will depend on the amount of training imparted in the first stages of implementation [52]. Training the users is essential during the initial stages of implementation, otherwise the intention to use the technology could be reduced [52,53].

However, due to the wide range of techniques and parameters involved, “cloud computing” systems are difficult to implement [54]. The common problems that users have must be explained to cloud computing specialists, so that they can be rapidly solved and users then feel more involved in the implementation [55,56]. This helps with communication between managers and employees when dealing with the different uses of the technology [53].

There are various research papers [57–59] about the ways in which training can benefit cloud computing [60], such as e-learning [61] and online collaborative writing [62]. Other papers analyze more generic issues, such as the use of cloud computing by staff in Higher Education [63].

Training members of the organization in cloud computing technologies before adopting them is important for successful integration and continues to be important later on. The organization must have training programs for improving the employees’ performance in the use of cloud systems.

Mitra [10] points out that organizations can obtain better results with cloud technologies by implementing knowledge feedback.

Tvrđíková [9] states that thorough user training and motivation systems are crucial for the successful transition of IT companies to cloud computing.

The points analyzed above give us several relationships for the formulation of the following hypotheses:

Hypothesis 3 (H3): *The training of staff and e-learning has a positive effect on the intention to use “cloud computing” systems.*

Hypothesis 4 (H4): *The training of staff and e-learning has a positive effect on Knowledge Management for the use of “cloud computing” systems.*

3.3. Internal Communication (CO)

The dissemination of information is a critical process in organizations, both to make good decisions [52] and in the processes of technology adoption in companies [53,56]. Therefore, it must be shared conscientiously in order to be effective on team performance [57].

In order for technology adoption processes to be successful, employees must be comfortable with the process of teamwork and horizontal communication [58]. Therefore, communication plays a fundamental role in the process of implementing any technology, especially when the task is highly interdependent and involves considerable uncertainty [59].

The process of transferring information among the members of a work team or organization is a particularly sensitive element when implementing a system [64]. This process is especially complex in cases of virtual teams. In traditional teams, the transfer of information is done face to face, while for virtual teams, it is carried out by electronic means [65]. Accurate and timely information about reaching goals, objectives, tasks, and updates is essential when implementing “cloud computing” systems [66]. These milestones can be achieved with regular meetings to discuss the advantages and limitations of the system [67].

An essential part of the implementation of the technology is measured by the time taken to exchange information about the system between the interested parties [68]. Moreover, prompt and effective communication improves the effectiveness of teams [69]. This continuous process of information exchange integrates diverse perspectives, insights and interpretations, and combined with trial and error and experimentation, improves the transfer of knowledge, accentuating the credibility and reliability of the information [70–72]. This gives value to the effort needed to use the new system [73], when dealing with the changes brought about by the implementation of the technology [74,75].

On the other hand, a lack of communication is directly related to the failure of many projects which implement information systems [74]. Likewise, poor communication among the members of a project leads to a variety of negative aspects that will influence performance [70].

Lin and Chen [55] show that from a more professional point of view, the absence of communication in the field of cloud computing can complicate the existing dynamics between developers and, consequently, the final usefulness of the product.

Taking into account the above, given that communication gives access to information about the benefits of the system and its distribution to all members of the organization, it is expected that the frequency and quality of communication will improve the intention to use “cloud computing” [74,76]. This leads us to propose the following hypothesis:

Hypothesis 5 (H5): *Internal communication has a positive effect on the intention to use “cloud computing” systems.*

3.4. Corporate Governance (CG)

The corporate governance of IT is a fundamental part of the governance of the organization and includes the leadership of organizational structures and processes that ensure that IT sustains and extends the strategy and objectives of the organization [6]. This concept, when referring to responsibilities, is defined as a framework of rights where those responsible for decisions should promote desirable behavior for IT use [77], without forgetting that corporate governance deals with justice, transparency, and responsibility of the company in the issues concerning the business and society as a whole [78].

The main advantage of applying “cloud computing” technologies to corporate governance is an improvement in information transparency, which is necessary for the relationship between the board of directors, the management, the shareholders, and the rest of the interested parties. The rules for the decision-making process for value generation by the organization can also be organized with systems that rely on this technology.

The choice of the measurements to assess this construct had data integrity as one of the central factors in the development of a cloud computing solution. Another measure was correct decision-making, which should measure the reduction of risks associated with the adoption of cloud computing technology [32]. Therefore, we measured security and governability. Governability is an understanding of the requirements, needs and the model that must be used to comply with the requirements established by the organization. Security was taken to mean an understanding of how to manage the risks associated with cloud computing technology and how these influence business objectives.

The use of corporate governance can assess the management capacity of an organization to determine if it is capable of identifying technologies that improve business performance through the use of cloud computing [78].

A correct corporate governance model for “cloud computing” can help organizations ensure a secure “cloud computing” environment and comply with all the information technology policies of the organization and improve corporate performance [79]. Therefore, relationships can be formulated between the use of corporate governance standards and the intention to use cloud computing in organizations.

The adoption of cloud computing allows companies to establish internal information exchange platforms and closely link business units to eliminate the phenomenon of “islands” of information, improve the effectiveness of information transmission, and strengthen the consistency of the company’s most important strategic objectives [80].

For all these reasons, the following hypothesis was formulated:

Hypothesis 6 (H6): *The degree to which corporate governance standards are applied has a positive effect on the intention to use “cloud computing” in the organizations that adopt it.*

An important characteristic of Computing is that it is a fundamentally creative technology where the development, deployment, scaling, updating, and payment for information and communication services [25] become the driving force behind corporate growth [10].

Hypothesis 7 (H7): *The degree to which corporate governance standards are applied has a positive effect on the training of staff and e-learning in organizations that adopt cloud computing.*

Organizations that adopt cloud services are likely to benefit from improvements in the competencies of leadership, business system thinking, relationship building, and providing and monitoring contracts [81]. Effective management and technical skills are required to successfully integrate new technologies into an existing system [82]. Cloud users can improve relationship competencies with providers by using better communication and socialization.

Hypothesis 8 (H8): *The degree to which corporate governance rules are applied has a positive effect on internal communication in organizations that adopt cloud computing.*

The proposed model, which is presented in Figure 1, can help to identify the most important factors in the “cloud computing” adoption strategy and the influence of corporate governance.

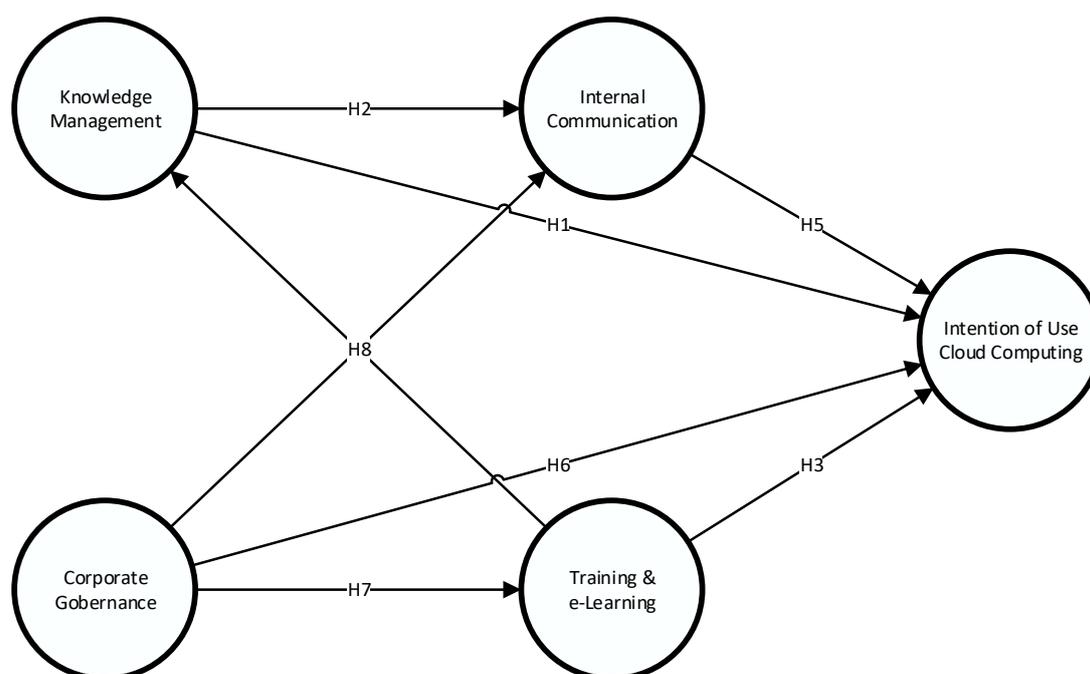


Figure 1. Proposed model.

4. Methodology

4.1. Measurement Method

The measurements were made using a survey that gathered information from executives of organizations and companies. The questionnaire was created in two stages. The first stage used 15 items about cloud computing which were extracted from the measurement scales used by other researchers: Corporate Governance (two items [32,77]), Training and e-learning (four items [37,43,72,73,76]), Knowledge management (KM) (four items, [36,39,45,70]), Intention to Use (two items, [32,79]) and Internal Communication (three items, [41,44,72,76,83]).

A Likert 5-point scale was used (1—Strongly disagree, 5—Strongly agree). This questionnaire gave results for the influence of attitudes and perceptions on the decision to implement cloud computing technology.

The second stage of the questionnaire creation phase consisted of including questions to find the demographic profile of the executives surveyed. Before a massive distribution of questionnaires was made, a pre-test was carried out on 40 executives. This resulted in valuable information that allowed the reformulation of some of the questions.

4.2. Data Collection

Important managers, businessmen and executives from the IT sector in southern Spain participated in this study. The population under study was configured in collaboration with representative organizations for technological companies. Companies that would be able to change their digital solutions to the new economic model of cloud computing were selected. The daily use of cloud computing, mainly the SaaS modality, is strategically important for these companies when providing their services to customers. These are medium size companies from different sectors which believe that the information system that they use is one of their main competitive advantages in the market. These processes can be diverse, from sales to production management, with the strategic power of the cloud computing system being the common denominator for all of them.

A sample of 275 representative companies was selected using a random sampling procedure. Telephone calls were made to verify the commercial addresses and the names of the managers/owners of the companies. The questionnaires were sent by mail to all the members of the selected sample, along with a cover letter and a prepaid return envelope. The possibility also existed for answering the questionnaire on a website made with Google Forms. After 2 weeks, follow-up calls were made. Finally, 186 surveys were obtained during a 9-week period (response rate 63.0%) and 22 non-valid questionnaires were excluded. Consequently, the final sample was $n = 164$.

It was found that the respondents occupied positions of responsibility and were responsible for decision-making, as well as being in the process of changing to a new “cloud computing” business model.

Table 1 shows the demographic distribution of the executives and their respective organizations.

Table 1. Demographic characteristics of the sample ($n = 164$).

Classification Personal Variable		Frequency	Percentage
Gender	Female	93	56.8%
	Male	68	41.6%
	Others	3	1.6%
Age	18–30	133	81.3%
	31–45	18	11.0%
	46–55	10	6.1%
	56–65	2	1.4%
	>65	1	0.2%
Classification Organization Variable		Frequency	Percentage
Organization size (classified by the number of workers)	Micro Company	92	56.4%
	Mini Company	43	26.3%
	SME Company	11	6.7%
	Company	18	10.6%

4.3. Statistical Analysis

The proposed model was validated for the entire sample with the results obtained for the variance and the distribution with the IBM SPSS statistical package (version 24). In the explanatory analysis, the *t*-test for independent samples, preceded by the Levene Test, was used to verify the equality or not

of the variances of the comparisons of subsamples obtained for different categorical or classificatory variables. This analysis was carried out using the statistical software IBM SPSS (version 24).

To test the hypotheses of the proposed conceptual model, the Partial Least Squares (PLS) technique was applied to estimate Structural Equation Models (SEM) based on variance. For Ref. [84], structural equation models (SEM) are very suitable in social sciences, economics and organizational management studies. They are a good choice when the simultaneous behavior of dependency relationships is under study. SEMs achieve more than diverse and varied multi-variable techniques, such as multiple regression or factor analysis [85]. The PLS technique was chosen because it is the most appropriate for predicting and investigating relatively new phenomena [86], such as cloud computing technology.

The factor loading was >0.7 for all items. Subsequently, SmartPLS 3 v. 3.2.7 software [87] was used and a PLS analysis of several groups was carried out to compare the differences between the groups. For a more accurate assessment of the sample size and its validity using PLS-SEM, the “effect size” was calculated for each regression.

The power tables provided by Ref. [88] were used to do this, and the improved tables were also consulted [86,89]. The result for four maximum predictors (maximum number of relationships that influence a construct) was that the minimum sample should be $n = 129$ for a power = 95.05% and critical $f = 2.444$. The current sample was sufficient to comply with these results.

5. Analysis of Results

5.1. Results of the Measurement Model

The PLS approach is defined by two models: the measurement model and the structural model.

As a preliminary step to the analysis of the structural model, it is necessary to analyze the reliability and validity of the measurement model. The procedure for the evaluation of the measurement models of reflective items is shown in Table 2 [90].

Table 2. Reliability, validity of the constructs and Fornell-Larcker criterion.

Constructs	Alfa de Cronbach	rho_A	CR	AVE	Fornell-Larcker Criterion				
					KM	CO	T	CG	IU
KM	0.930	0.936	0.950	0.828	0.910				
CO	0.845	0.854	0.890	0.618	0.621	0.786			
TE	0.955	0.972	0.966	0.849	0.421	0.563	0.921		
CG	0.828	0.926	0.918	0.849	−0.233	−0.375	−0.164	0.921	
IU	0.800	0.804	0.909	0.832	0.440	0.557	0.457	−0.105	0.913

rho_A = Dijkstra-Henseler Rho_A; CR = Composite Reliability, AVE = Average Variance Extracted, KM = Knowledge Management, CO = Internal Communication, TE = Training and e-Learning, CG = Corporate Governance, IU = Intention to Use “cloud computing”.

Reliability was assessed by examining individual loads or simple correlations of the measures with their respective latent variables (≥ 0.7 were accepted). The Cronbach alpha coefficient was used as the reliability index of the latent variables.

In addition, the composite reliability was calculated. The convergent validity of the latent variables was evaluated by inspecting the average variance extracted (AVE) (>0.5 were accepted). The discriminant validity of the latent variables was verified using the Fornell-Larcker [76] criterion when examining whether the square root of the average extracted value (AVE) of each item was above the correlations with the other latent variables [82].

Table 2 shows that the square root of the average variance extracted (AVE) for each construction is greater than its highest correlation with any other construction.

In addition, in Table 3, the results of another of the tests to which the study was submitted are recorded, as indicated by Henseler, Ringle & Sarstedt [91].

Table 3. Heterotrait-monotrait ratio (HTMT).

	KM	CO	TE	CG	IU
KM					
CO	0.686				
TE	0.435	0.604			
CG	0.246	0.423	0.171		
IU	0.505	0.673	0.502	0.121	

These researchers carried out simulation studies to demonstrate that a lack of discriminant validity is better detected by means of another technique: the heterotrait-monotrait ratio (HTMT), which they had discovered earlier. All the HTMT ratios for each pair of factors were <0.90 [92,93].

5.2. Results of the Measurement Model

After examining the measurement model, the relationships between the constructs were analyzed. The path coefficients of the hypotheses were studied. Bootstrapping of 5000 subsamples was done to verify the statistical significance of each route. The explained variance (R-square) of the endogenous latent variables and the p -value of the regression coefficients (t -test) were used as indicators of the explanatory power of the model (Table 4). The results obtained allowed all the hypotheses to be accepted, except H1 and H6, because there were statistically significant differences in some of the relationships between variables in our model (p -value > 0.05).

Table 4. Path coefficients ratio.

Path	Original Sample (O)	T Statistics (O/STDEV)	Lower CI	Higher CI	Parametric p Value (Sig.)
H1: KM \rightarrow IU	0.133	0.930	-0.102	0.350	0.247
H2: KM \rightarrow CO	0.565	9.037	0.443	0.685	0.000
H3: TE \rightarrow IU	0.173	2.051	0.004	0.339	0.040
H4: TE \rightarrow KM	0.421	6.133	0.291	0.558	0.000
H5: CO \rightarrow IU	0.419	3.503	0.156	0.631	0.000
H6: CG \rightarrow IU	0.112	0.098	-0.100	0.263	0.219
H7: CG \rightarrow TE	0.164	2.186	-0.315	-0.002	0.029
H8: CG \rightarrow CO	0.243	3.097	-0.392	-0.087	0.002

KM = Knowledge Management, CO = Internal Communication, TE = Training and e-Learning, CG = Corporate Governance, IU = Intention to Use "cloud computing".

5.3. Goodness of Fit Test for the Model

First, the global adjustment of the model was evaluated using the Standardized Root Mean Square Residual indicator (SRMR). Hu & Bentler [94] define SRMR as the mean root mean squared discrepancy between the correlations observed and the correlations implicit in the model. SRMR can be used to evaluate the overall fit of a research model in PLS and avoid incorrect specification of the model [95]. A cut-off value of 0.08 for SRMR is considered to be the most adequate in PLS [95]. In this study, SRMR was 0.073 (<0.08) which means that the model fits the empirical data [90].

The values of R^2 (see Table 5 and Figure 2) obtained for the investigation led to the following conclusions: 0.67 "Substantial", 0.33 "Moderate" and 0.19 "Weak" [86]. The result obtained for the main variable dependent in the Intention to Use model (IU) was $R^2 = 35.8\%$.

Therefore, the evidence shows this model to be moderately applicable for the adoption of "cloud computing" using the rules of corporate governance. It is logical that variables that are not endogenous do not have a value of R^2 .

The blindfolding technique consists in omitting part of the data for a given construct during the estimation of parameters and then trying to estimate what was omitted from the estimated parameters [86].

In this way, the predictive relevance of the model was studied, and using the Stone-Geisser (Q^2) test [96,97], the model was shown to have predictive capacity.

As can be seen in Table 5, all endogenous constructs fulfil $Q^2 > 0$. In addition, the Stone-Geisser Q^2 values of 0.02, 0.15 and 0.35 indicate small, medium and high predictive relevance [80]. All the constructs in the model have predictive relevance, since the Q^2 values are all greater than 0.02, except Training and e-Learning (TE), that has only small relevance, with a very low value of Q^2 (0.019), but the rest of the constructs have high values. Intention to Use (IU) had the highest value (0.270).

Therefore, the proposed research model has a high predictive power when explaining the Intention to Use (IU) the “cloud computing” technology under corporate governance rules.

Figure 2 shows the result for the model of the complete sample and the hypotheses which were analyzed.

Table 5. Q^2 and R^2 results.

Construct	Q^2	R^2 (%)
Knowledge management(KM)	0.134	17.8
Internal Communication (CO)	0.247	44.2
Training and e-learning (TE)	0.019	2.7
Intention to Use (IU)	0.270	35.8

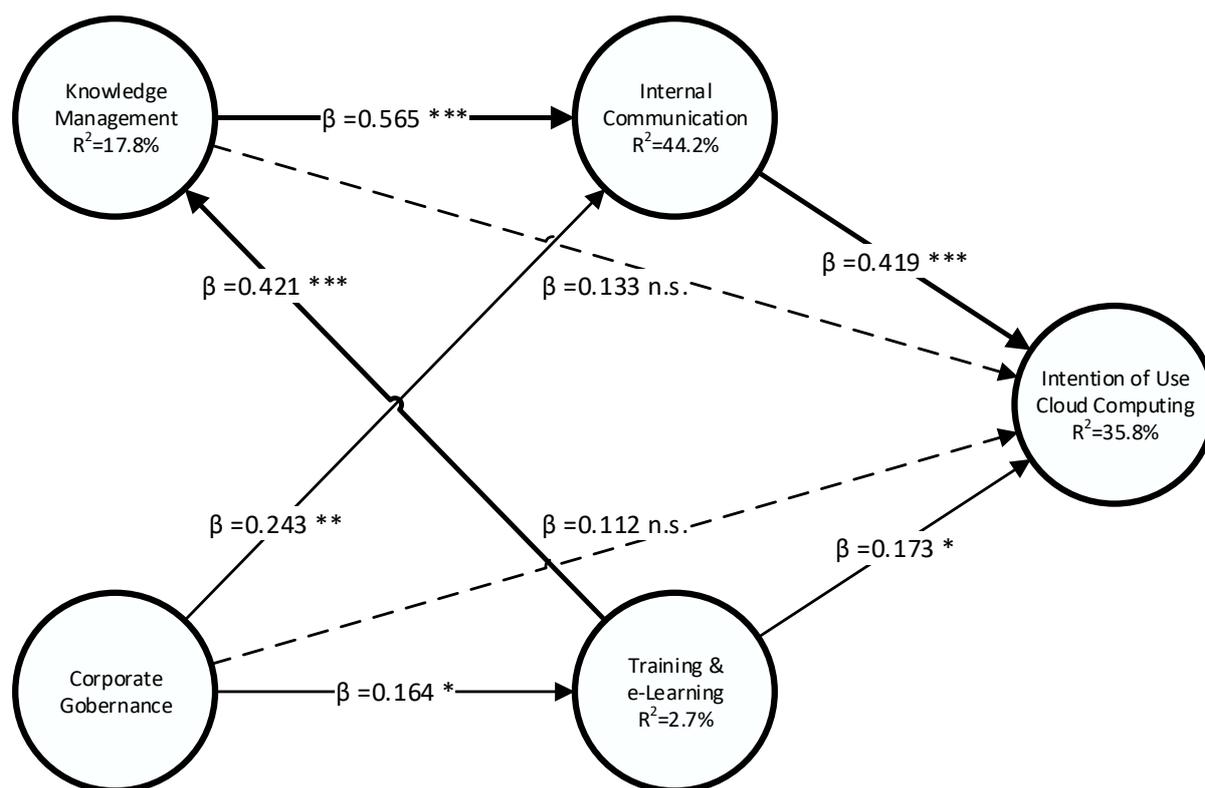


Figure 2. PLS results for the entire sample.

6. Discussion

This research analyzed the differences in the adoption of “cloud computing” associated with the corporate governance capacity of the managers, partners or owners of the companies which were studied. Likewise, how this capacity can explain attitudes towards the adoption of “cloud computing” as a new business model for technology-based companies was also studied.

From the results obtained in the sample, we find that Knowledge management (KM) does not significantly influence ($\beta = 0.133$; $t = 1.159$) the Intention to Use (IU), and therefore, hypothesis H1 is

not accepted. However, KM does not influence IU, but it does so through Internal Communication (CO). This construct provides the highest explanatory capacity of the model ($R^2 = 44.2\%$) and predictive capacity ($Q^2 = 0.247$), which is even more than the final dependent construct of Intention to Use (IU) ($R^2 = 35.8\%$) and is important when explaining $KM \rightarrow IU$ indirectly, through Internal Communication (CO). Of all the relationships studied, the one with the highest path coefficient is $KM \rightarrow CO$ ($\beta = 0.565$; $t = 9.037$), with a 99.9% confidence level. Therefore, H2 is accepted.

As can be seen in the literature review, the participation of senior management during the implementation of IT is justified, firstly, because the broader organizational vision allows identification of business opportunities derived from the exploitation of the implemented technologies [98]. In the case of “cloud computing”, senior management plays an important role because the implementation of this technology can involve the integration of resources and process reengineering [83]. These scientific contributions are supported by this study, given that it is a pillar of the model which ensures relationships such as H2, with important significance. However, this study reveals that Knowledge management (KM) does not exert a direct influence on Intention to Use (IU), but it does through Internal Communication (CO). This result suggests that the true role of Knowledge management is supporting and positively influencing improvements in the communication processes that are needed for the correct implementation of “cloud computing” in the organization.

The investment involved in the implementation of any technology such as “cloud computing” can have important implications for organizations. The explanatory and predictive capacity of the model is supported by Knowledge management (KM) ($R^2 = 17.8$; $Q^2 = 0.134$), given the vision and commitment to the adoption of “cloud computing” technology by Knowledge management, which is essential for any technological innovation.

The Training and e-learning (TE) construct has only a little explanatory ($R^2 = 2.7\%$) and predictive ($Q^2 = 0.019$) capacity. The $TE \rightarrow IU$ relationship is significant ($\beta = 0.173$; $t = 2.051$), but with a confidence level of 95%, which was the lowest of the model. H3 was also supported. It has a notable influence on Knowledge management $TE \rightarrow KM$, (KM) ($\beta = 0.421$; $t = 6.133$) with a confidence level of 99.9%. H4 was also supported, which means Training and e-learning (TE) influences Intention to Use (IU) because of the influence of $KM \rightarrow CO$.

The relative importance that the final model for the adoption of “cloud computing” gives to Training and e-Learning can be explained by the complexity of “cloud computing” technology. For a complex information system such as “cloud computing”, the organization needs to train its employees and provide information about it, so that it can be used in an effective way in the future. This reduces the possible stress for staff and provides greater motivation and a better understanding about the benefits of the “cloud computing” system for their tasks [34]. In this way, Training and e-learning positively influence the feeling of support provided by senior management, which means that all the staff in the organization should participate in the training plan, which should go hand in hand with the adoption and final implementation of the “cloud computing” technology.

On the other hand, the influence of Training and e-learning (TE) on Internal Communication (CO) is indirect and always through Knowledge management (KM). Training and e-learning (TE) allow users to share common problems that arise when working with the system, which can have the effect of increasing the communication about it. Therefore, the training programs that the company establish for the “cloud computing” system are expected to provide a fluent communication channel and a way to deal with the different aspects related to the system’s use.

Internal Communication (CO), as stated above, is an important factor in the model due to its explanatory and predictive capabilities and has a significant influence on Intention to Use (IU) ($\beta = 0.419$; $t = 3.503$) with a confidence level of 99.9%. This means that H5 is supported. This result corroborates previous studies. When a new information system is introduced, employees should be informed in advance about the scope, objectives, tasks, and updates that the implementation of said system will entail and thus will be able to accept the changes that take place [67]. Therefore, as stated above, a lack of communication about a new “cloud computing” system will negatively affect

the users' perception of the usefulness of the adoption of this technology. Lin & Chen [55] show that a lack of communication for a "cloud computing" system can complicate the existing dynamics of developers and also the perceptions about the final utility of the product. Taking into account the above, given that communication allows access to information about the system's benefits and distributes this information to all members of the organization, the frequency and quality of communication is expected to improve the final intention to use "cloud computing" [76,85].

H6 for corporate governance (CG) is not supported, since the CG → IU relationship is not significant ($\beta = 0.112$; $t = 1.198$). Even though this relationship is not proven, corporate governance does influence Intention to Use (IU), but by the indirect effect of a substantial improvement in Internal Communication. The influence of corporate governance (CG) on Training and e-learning (TE) is positive ($\beta = 0.164$; $t = 2.186$) and thus H7 is supported with a 95% confidence level. This means that the implementation of adequate codes of corporate governance positively influences the implementation of active training plans for "cloud computing". This result means that using codes of good corporate governance benefits the human resources of the organization with adequate training plans in organizations that adopt "cloud computing" technology.

Corporate governance (CG) can be seen to influence Intention to Use (IU) indirectly and mainly with the influence of the Internal Communication construct (CO) ($\beta = 0.112$; $t = 1.198$) and with 99% confidence level. This data shows that H8 is supported. This result shows that codes of good corporate governance imply greater transparency in information at all levels, and the adoption of "cloud computing" is influenced by the quality of internal communication. Therefore, a correctly structured corporate governance policy will improve Internal Communication (CO), which is the construct that contributes most to the explanatory/predictive capacity of the model ($R^2 = 35.8\%$; $Q^2 = 0.270$) and therefore to the Intent to Use (IU) "cloud computing" technology

7. Conclusions

This research analyzed the adoption of "cloud computing" technology from the point of view of corporate governance capacity and three other constructs: Training and e-learning, Knowledge management and Internal Communication. This study increased the existing theory on the adoption and acceptance of "cloud computing" in organizations, mainly studying the influence of corporate governance.

The data was collected from administrators, partners and owners of companies in Spain, but from a region of the country with a low level of industrialization and technological innovation (Andalusia, in southern Spain). The behaviour of organizations for which "cloud computing" is becoming a strategic value was investigated by using a survey. The results of this study concluded that an adequate corporate governance policy positively influences the intention to use "cloud computing". In addition, it does so indirectly with an important predictor: Internal Communication. This result supports the recent policies of the European Union on "cloud computing" and the importance that should be given to its disclosure and use. Within the Digital Agenda of the European Commission, a set of initiatives were launched to increase the use of IT by SMEs. The strategy gave special importance to the initiative: "Unlocking the potential of cloud computing in Europe", which defines "cloud computing" as an opportunity to improve business competitiveness with the adoption of different technological solutions [2].

One of the best factors for "cloud computing" adoption is the proper application of codes of good corporate governance in organizations, due to its influence on the improvement of transparency and internal communication. Adequate security and governance of the administration of "cloud computing" systems will provide improvements in business performance, as these indirectly help the adoption of "cloud computing". An appropriate model of corporate governance in the cloud will help organizations to ensure a secure "cloud computing" environment which complies with all the organizational information technology policies. Likewise, importance must be given to the proper understanding of cloud security and adequate planning for it before implementing the technology.

Therefore, there is a need for corporate human resources training. This training, together with good governance, can effectively address problems and concerns about security and privacy.

This study had a notable limitation as it was carried out with companies that deployed “cloud computing” using a SaaS modality, which is a type of “cloud computing” where the software is conceived as a service (Software as a Service) and that allows users to connect and use cloud-based applications on the Internet. In this modality, all the underlying infrastructure, middleware, software, and application data are located in the provider’s data center. Despite being the most widespread modality, it is not the only possibility and it coexists with IaaS (Infrastructure as a Service) and PaaS (Platform as a Service), which have not been studied with this sample. At present, immediate consequences are being seen in the economic model of organizations which use this modality (SaaS).

Given that Spain shares some cultural characteristics with other countries in southern Europe and Latin America, the results of this study will hopefully be able to help other countries to determine decisive factors in the adoption of “cloud computing”. Consequently, future studies could focus on the characteristics/personality traits of managers/owners and on comparing strategies and good practices of companies that have and have not adopted “cloud computing” technology. In addition, future research could validate the research model and consider other moderators associated with demographic features, such as age, gender or educational level. In the same way, the proposed research model could be validated using other technologies that can improve organizations’ way of doing business. Examples of this are the Internet of Things or Big Data that, together with “cloud computing”, will be the main digital transformations in Europe.

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