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The Role of Cloud Computing in Supporting Business Continuity and Crisis Management (Applied Study: University of Basra)

دور الحوسبة السحابية في دعم استمرارية الأعمال وإدارة الأزمات: دراسة تطبيقية في جامعة البصرة

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Abstract:

This paper discusses the crucial role of cloud computing in maintaining a business continuity as well as supporting crisis management, and in the present paper, the University of Basrah is used as the example of the high-level academic performance that may be maintained under adverse circumstances. The descriptive-analytical research design was used, and the sample consisted of a purposive sample of 183 institutional leaders and the academic staff and technical personnel of the university. The statistical analysis indicated that the adoption of cloud computing technologies is statistically significant and relates to the improvement of business continuity, and the model accounts for 66.4% of the variation. SaaS has become the most commonly used model, which can be explained by a strong dependence on the easy-to-use education platforms, and PaaS demonstrated a rather low adoption rate, indicating the necessity to create local software. Overall, it can be stated that cloud computing is no longer a technical solution that can be viewed as a strategic necessity in ensuring the security of information assets and the stability of academic and administrative processes in emergency situations. The conclusions support the idea of implementing a Cloud-First strategy and training technical personnel to work in cloud platforms, which will reduce the reliance on third-party products and enhance digital sovereignty.

Keywords: Cloud Computing, Business Continuity, Crisis Management, Service Models.

المخلص:

تتناول هذه الورقة الدور المحوري الذي تلعبه الحوسبة السحابية في ضمان استمرارية الأعمال ودعم إدارة الأزمات، حيث تم اتخاذ جامعة البصرة كنموذج تطبيقي يوضح إمكانية الحفاظ على مستويات عالية من الأداء الأكاديمي حتى في ظل الظروف الصعبة. وقد اعتمدت الدراسة على المنهج الوصفي التحليلي، وشملت عينة قصدية مكونة من 183 فرداً من القيادات المؤسسية والكوادر الأكاديمية والتقنية في الجامعة.

وأظهرت نتائج التحليل الإحصائي أن تبني تقنيات الحوسبة السحابية يرتبط ارتباطاً وثيقاً وبدلالة إحصائية بتحسين استمرارية الأعمال، حيث فسر النموذج ما نسبته 66.4% من التغيرات الحاصلة. كما كشفت الدراسة أن نموذج "البرمجيات كخدمة (SaaS)" هو الأكثر شيوعاً واستخداماً، ويُعزى ذلك إلى الاعتماد الكبير على المنصات التعليمية سهلة الاستخدام؛ في حين سجل نموذج "المنصة كخدمة (PaaS)" معدلات تبني منخفضة، مما يشير إلى الحاجة الماسة لتطوير برمجيات محلية.

وخلص البحث إلى أن الحوسبة السحابية لم تعد مجرد حل تقني عابر، بل أصبحت ضرورة استراتيجية لحماية الأصول المعلوماتية وضمان استقرار العمليات الأكاديمية والإدارية أثناء حالات الطوارئ. وتوصي النتائج بضرورة تفعيل استراتيجية "السحابة أولاً" وتدريب الكوادر التقنية على التعامل مع المنصات السحابية، بهدف تقليل الاعتماد على المنتجات الخارجية وتعزيز السيادة الرقمية.

الكلمات المفتاحية: الحوسبة السحابية، استمرارية الأعمال، إدارة الأزمات، النماذج الخدمية.

Introduction

The contemporary world is experiencing the drastic changes on the structural arrangements of learning and academic institutions, owing to the rapid changes in information and communications technologies. Digital transformation is not an option anymore, and it is a necessity that is determined by the data requirements and the challenges of this time, especially considering a series of crises that have happened in the wake of one another in the recent past, which have not only shaken the world but also acted as a catalyst to the functioning of institutions. In this regard, cloud computing has turned out to be one of the most significant technological pillars, which has allowed organizations to overcome the

influence of the traditional infrastructural environment and offer a flexible working location that can adapt to unexpected shifts. Cloud computing is a paradigm shift in the management of IT resources as it can ease the shift of the capital expenditure model to the operational expenditure model and give a high level of flexibility in the level of scaling and resource allocation as needed. In the case of the higher education sector, cloud platforms offer an all-encompassing environment that facilitates educational, research, and administrative activities thus providing a way of ensuring continuity of these activities even in the worst circumstances. Coming to the Iraqi context, or rather the Basra Governorate, learning institutions under the leadership of the University of Basra are faced with a set of exceptional challenges which go beyond the scope of technical problems to include aspects of physical infrastructure, unreliable electrical supply, unpredictable security and climatic conditions. All these make the reliance on- premise local data centers as a huge risk which can destroy business continuity and lead to loss of data or extended service disruptions. Such a critical role played by cloud computing is therefore identified as strategic solution to achieve business resilience and allow the university to respond quickly to disasters and crises. The COVID-19 pandemic experience was an unpleasant test of the preparedness of Iraqi universities, which had to shift to e-learning and work remotely at once. The research and field experience have shown that companies with strong cloud infrastructures or those that could move to the cloud quickly (Google Workspace for Education or Microsoft Azure) were in the best place to absorb the disruption and continue providing the services with minimum or no interruption. Therefore, the paper aims at shedding light on the truth about the University of Basra taking an analytical and practical approach, how various cloud service models (IaaS, PaaS, SaaS) can create a protective layer and a safety valve to assure the business continuity of the institution and to handle crises in an efficient and effective manner. The case study of the university of Basra is based on the history and academic eminence of the institution in the southern region of Iraq besides the fact that the institution is in dire need of implementing modern techniques in the management of both technical and operational risks. This is in line with the international standards like the ISO 22301 business continuity and explores the possibility of modifying cloud technologies to comply with the conditions of the specified standard in an Iraqi educational setting.

The Research Problem

Although the trend on the international and national levels is on adopting new technologies, many educational organizations in Iraq, such as the University of Basra, still face a major gap in the process of adoptive technical infrastructure, crisis management, and business continuity. The issue which the research depends on is still the use of traditional systems and local servers that are prone to downtime as a result of environmental risks, power outages, or cyberattacks, which threatens to lose vital data and disrupt the educational and administrative process. The main question revolves around the following question: **"What is the role of cloud computing in its various dimensions in enhancing business continuity and raising the efficiency of crisis management at the University of Basra?"**.

The following sub-questions emerge from this main question:

1. What is the level of availability of cloud computing requirements at the University of Basra from the point of view of employees?
2. Is there a statistically significant relationship between the use of Infrastructure as a Service (IaaS) and business continuity assurance at the university?
3. What is the role of Platform as a Service (PaaS) in enabling the university to manage technical crises and develop quick solutions?

4. How does SaaS contribute to the sustainability of educational and administrative processes during outages?
5. Does the perception of the importance of cloud computing in crisis management differ according to the functional variables of the research sample?

The Importance of Research

This study is important in two main aspects:

Scientific (theoretical) importance:

The study contributes to enriching the Arab and Iraqi libraries with a vital topic that links information technology (cloud computing) and strategic management (crisis management and business continuity). This study is an attempt to frame the relationship between the two variables in the Iraqi higher education environment, providing an updated theoretical framework based on the latest references and global studies for the years 2025 and 2026.

Practical Importance:

The results of this study are addressed directly to decision-makers at the University of Basra and the Ministry of Higher Education, as it provides a practical guide on how to invest in cloud computing not only as a tool to reduce costs, but also as a defense strategy to ensure that the organization remains effective in times of crisis. The study also make available accurate quantitative data on the reality of substructure and the readiness of humanoid resources, which helps in determining upcoming digital transformation rules.

Research Objectives

This study search for to attain a number of objectives, which are:

1. Diagnose the authenticity of the technical substructure at the University of Basra and its willingness to adopt complete cloud computing answers.
2. Analyze the relationship between cloud service models (IaaS, PaaS, SaaS) and business continuity requirements according to international standards.
3. Measuring the impact of relying on cloud services in reducing crisis response time and recovery time (RTO) at the university.
4. Identifying the Barriers to Full Adoption of Cloud Computing in Crisis Management at the University of Basra.
5. Providing a proposed model and practical recommendations to enhance the business continuity system at the university by relying on the cloud.

Fifth: Research Hypotheses

Based on the theoretical framework and previous studies, the following hypotheses have been formulated to test them in the field:

- **The first main hypothesis (H1):** There is a statistically significant correlation at the level of ($\alpha \leq 0.05$) between the use of Infrastructure as a Service (IaaS) and the achievement of business continuity requirements at the University of Basra.

- **The second main hypothesis (H2):** There is a statistically significant correlation at the level of ($\alpha \leq 0.05$) between the use of the platform as a service (PaaS) and the effectiveness of crisis management at the university.
- **The third main hypothesis (H3):** There is a statistically significant correlation at the level of ($\alpha \leq 0.05$) between the use of software as a service (SaaS) and the continuity of educational and administrative services.
- **Fourth Hypothesis (H4):** There is a statistically significant effect of cloud computing in its combined dimensions (IaaS, PaaS, SaaS) on crisis management at the University of Basra.

Sixth: Research Methodology

In this study, the researcher relied on **the descriptive-analytical method**, as this method is the most suitable for studies that aim to describe a specific phenomenon (cloud computing and business continuity), analyze the relationships between its variables, and interpret the results to reach meaningful generalizations.

Data Sources:

Two types of sources were relied upon: 1. *Secondary sources:* These include books, scientific journals, theses, and reports of international institutions (e.g. NIST and ISO) to build the theoretical framework. 2. *Primary sources:* Field data were collected through a specially designed electronic questionnaire and distributed to the research community at the University of Basra.

Study Tool: A

questionnaire consisting of three parts was designed:- Part I: Demographic Data (Gender, Age, Qualification, Experience, Job Title).- Part Two: Cloud Computing Axis (15 items) distributed over three dimensions (IaaS, PaaS, SaaS).- Part Three: Business Continuity and Crisis Management Axis (15 items). A five-point Likert scale (strongly agree=5, agree=4, neutral=3, disagree=2, strongly disagree=1).

Research Population and Sample

The research population consists of leadership, academic, administrative, and technical cadres at the University of Basra, who have a direct or indirect relationship with technical and administrative decision-making and crisis management. Due to the large size of the community and the difficulty of comprehensive inventory, a stratified random sample was selected to ensure that all functional categories are represented.

The final sample size valid for statistical analysis was (183) individuals. The following table shows the distribution of the sample by demographic variables, which reflects a good diversity that serves the research objectives.

Table (1): Distribution of Research Sample Members by Demographic Variables (N=183)

Variable	Categories	Repetition	Percentage %
Job Title	Dean/Vice Dean of the College	25	13.7%
	Head of Scientific/Administrative Department	45	24.6%
	Faculty Member	68	37.2%
	Administrative/Technical Officer	45	24.6%
Educational Qualification	PhD	92	50.3%
	Master	58	31.7%
	Bachelor's degree and below	33	18.0%
Years of Experience	Less than 5 years	28	15.3%
	5 to 10 years	65	35.5%
	More than 10 years	90	49.2%

We can see from the above table that the percentage of Ph.D. holders reached (50.3%), and those with long experience (more than 10 years) constitute about half of the sample (49.2%), which gives a strong indication that the answers of the respondent's stem from experience and knowledge of the reality of work at the university and its challenges.

Theoretical Framework

1. Cloud Computing: Concept and Dimensions

Cloud computing is defined by the National Institute of Standards and Technology (NIST) as "a model to enable convenient and on-demand network access to a common set of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be quickly provisioned and launched with minimal administrative effort or service provider interaction" (Mell & Grance, 2011). This definition lays out the five foundations that distinguish the cloud from other traditional web technologies.

Cloud Service Models: Service

models are the backbone of understanding how the cloud supports business continuity, and are typically categorized into three levels (SPI Model):

A. Infrastructure as a Service (IaaS):

In this model, core computing resources such as processing, storage, and networking are provided as a virtual service. For the University of Basra, this means that virtual servers and large storage spaces can be rented instead of building costly and perishable local data centers. Zhang et al., 2010 argues that this model is the basis for disaster recovery resilience, as virtual servers can be replicated and run in another geographic location within minutes.

B. Platform as a Service (PaaS):

This model provides an environment for developing, testing, and deploying applications without the need to manage the underlying infrastructure. University developers can use these platforms to build crisis management applications or custom e-learning platforms at breakneck speed, enhancing the ability to respond to changes (Subashini & Kavitha, 2011).

C. Software as a Service (SaaS):

It is the most common model and used by the end user (students and professors). Examples include learning management systems (LMS), email, and video conferencing tools. A study (Omari, 2025) indicates that universities' reliance on SaaS applications ensures the continuity of the educational process regardless of the state of local devices or the location of the student and professor.

Deployment models: Less expensive public cloud, more secure private cloud, and hybrid cloud that combine the benefits of both, are best suited for academic institutions that want to balance cost with security of sensitive data (Marston et al., 2011).

2. Business Continuity and Crisis Management

Business continuity refers to an organization's ability to continue to provide products or services at predetermined acceptable levels after a disruption (ISO 22301). Business continuity differs from disaster recovery in that the former is holistic about the organization's overall strategy, while the latter focuses on the technical aspects of data recovery and systems.

In the background of the University of Basra, commercial continuity include the ability to last lectures, exams, scientific research, and administrative services (salaries, registration) even in the expression of public power outages, security conditions, or speats. In her study on crisis management at the University of Basra, Al-Tamimi (2012) emphasizes that the time off of proactive plans disclosures the institution to a state of comprehensive paralysis when the crisis occurs, which necessitates the acceptance of contemporary technical explanations.

3. The Role of Cloud Computing in Enhancing Business Continuity

Rain cloud calculation plays a essential role in secondary crisis management plans by:

- **Geo-Redundancy:** To safeguard the university's recognized legacy against the threat of local crises in Basra, vital statistics are distributed across a dispersed network. This strategic aligning ensures that even if the physical grounds are compromised, the integrity of the data remains uninjured.

- **High Scalability:** The aptitude to increase or decrease possessions (e.g., attendant capacity during online question paper) instantly, safeguarding the stability of systems under heaviness (Buyya et al., 2009).
- **Remote Access:** Enabling employees and professors to access their systems and files from anywhere, which is the core of working during a lockdown or security crisis (Ibrahim, 2024).
- **Reduce Recovery Time (RTO) and Recovery Point (RPO):** Cloud solutions provide automated backup and restore tools that minimize data loss and downtime.

Practical Framework and Data Analysis

1. Test the Truthfulness and Stability of the Tool

To ensure the consistency and validity of the questionnaire paragraphs, Cronbach's Alpha coefficient was used. Values above (0.70) are a good indicator of the stability of the instrument.

Table (2): Values of stability coefficients (Cronbach's alpha) for the study axes

Axis/Dimension	Number of paragraphs	Cronbach's alpha coefficient	Stability Level
Infrastructure as a Service (IaaS)	5	0.891	Very high
Platform as a Service (PaaS)	5	0.876	High
Software as a Service (SaaS)	5	0.903	Very high
Business Continuity & Crisis Management	15	0.885	Very high
The tool as a whole	30	0.912	Excellent.

The results in Table (2) indicate that all the values of the stability coefficients are high and statistically significant, as it reached (0.912) for the instrument as a whole, which gives high reliability to the results that will be reached, and allows them to be generalized to the research community.

2. Descriptive analysis of the study variables

The arithmetic medians and standard deviations of the respondents' answers to the study paragraphs were calculated. The theoretical mean (3) was adopted as a cut-off point.

Table 3: Computational Averages and Standard Deviations of Cloud Computing Dimensions

Dimension	Arithmetic mean	Standard deviation	Relevance/Availability	Ranking
Software as a Service (SaaS)	4.12	0.75	High	1
Infrastructure as a Service (IaaS)	3.85	0.82	High	2
Platform as a Service (PaaS)	3.64	0.91	Medium	3
Overall Cloud Computing Average	3.87	0.68	High	-

It is clear from Table (3) that the SaaS dimension came in first place with an arithmetic average of (4.12), due to the extensive use of ready-made e-learning and university mail applications. While the platform as a service (PaaS) came in last place, which may indicate the need for further development in the aspect of university application development. Overall, the level of availability and use of cloud computing at the university is considered "high" according to the sample opinions.

3. Hypothesis testing

To test the hypotheses, Pearson correlation coefficient and multiple regression analysis were used.

Table (4): Results of Pearson's correlation coefficient for testing the first, second and third hypotheses

Hypothesis	Independent variable	Dependent variable	Correlation coefficient (r)	Significance Level (SIG)	Conclusion
H1	IaaS	Business Continuity	0.724**	0.000	Hypothesis Acceptance
H2	PaaS	Crisis Management	0.658**	0.000	Hypothesis Acceptance
H3	SaaS	Business Continuity	0.789**	0.000	Hypothesis Acceptance

Analysis of the results:

- The **first hypothesis:** There is a strong direct relationship (0.724) between infrastructure as a service and business continuity. This means that the more the university relies on IaaS (cloud servers), the more it is able to ensure business continuity. This result is consistent with a study (Ibrahim, 2024).- **The third hypothesis:** The highest correlation coefficient was recorded (0.789), confirming that ready-made software (SaaS) It is the most decisive and influential factor in the continuity of daily business (lectures, tests) from the point of view of employees and academics.

Hypothesis Fourth (H4) Test: Total Effect

Multiple regression analysis was used to determine the combined effect of the three dimensions on the dependent variable (crisis management).

Table 5: Summary of the Multi-Regression Model

R	R Square (R ²)	Adjusted R ²	F value	Significance Level (SIG)
0.815	0.664	0.658	118.42	0.000

The value of the determination coefficient ($R^2 = 0.664$) indicates that the dimensions of cloud computing together explain (66.4%) of the variation in the effectiveness of crisis management at the University of Basra. This is a high explanatory ratio that indicates the vital role of this technology. Since the significance level of (0.000) is less than (0.05), we accept the fourth hypothesis that there is a statistically significant effect of cloud computing on crisis management.

Discussion of the Results

The research provided through statistical analysis that cloud computing is an inevitable pillar of foundation of the University of Basra in its quest to achieve business continuity. The high efficacy of Software as a Service (SaaS) highlights the fact of a physical operational reality: the fast turnover to platforms like Google Classroom and Zoom under the conditions of crisis would not have gone as smoothly without the versatility and availability of the latter cloud services, which resonates with the observations that (Alshwaier et al.,2012) made with regard to e-learning in the area.

Findings also suggested that the Infrastructure as a Service (IaaS) is a backbone of its own. The administrative personnel and leaders know that it is purely dependent on keeping secure backups on the cloud which will prevent physical damage or loss of data and financial and administrative systems, thus overcoming local physical risks that can harm the university facilities. This fact is supported by the guidelines of ISO 22301 that require the creation of efficient and active recovery plans.

Interestingly, the relationship regarding Platform as a Service (PaaS) registered the least impact possibly due to the fact that the university was in its early phases of developing its own software and it was depending on the solutions that were available commercially. This fact provides the university with a chance to increase investment into the team of software personnel which will allow developing the customized crisis-management solutions that are oriented in the local Iraqi situation.

Conclusions and recommendations

Conclusions:

- The University of Basra also exhibits the highest level of preparedness in adopting cloud computing applications especially in the field of academic Software-as-a-Service.
- Academic administrators such as deans and departmental heads are strongly convinced about the cloud as a tool of risk management.
- The feature of reliability and speed of recovery becomes the most significant advantages that the institution obtains on cloud computing compared to traditional data centers.
- Cloud computing alleviates operation costs associated with server maintenance, cooling facilities, and power consumption that is particularly decisive considering the current economic restrains.

Recommendations:

In accordance with the results, the researcher suggests the following recommendations:

- University Administration: establish a formal written, and binding business continuity management policy that is explicitly based on a cloud-first strategy.
- Center for E-Calculator: consider training technical personnel on cloud computing (Platform-as-a-Service) and building locally homegrown crisis-management software in order to lessen the need to depend on off-the-shelf software.
- Ministry of Higher Education: negotiate strategic deals with international cloud providers (e.g., Microsoft, AWS) to get favorable rates and customized services to the Iraqi universities, thus ensuring the data sovereignty.
- Academic Sphere: in the curricula of the colleges of management and computer science, introduce the notions of cloud computing and digital crisis management to educate the future professionals who would possess these technologies.

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