

## A Review of Mediation Effect of the Accounting Information System of the Relationship Between Information System and Profitability of Building Information Modelling

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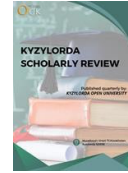
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**Abstract.** This review article researches the degree of the influence of Accounting Information Systems (AIS) on the Information System (IS) performance and the efficiency of BIM in Iraq's petroleum industry. The survey was designed to collect data on 306 projects implemented by the sector, which had an 82% response rate with 251 valid responses when the survey was taken. During the analysis process, we inserted descriptive statistics to perform Partial Least Square-Partial Least Square- Structural Equation Modelling (PLS-SEM). The general conclusion is that the profit of BIM can only be enhanced if the efficiency of IS is high and the work of accounting information systems has equal prominence in BIM. Lies at the heart of this study is a call for businesses involved in BIM operations to invest heavily in information systems (IS) and obtain management information systems (AIS) in their strategic operations. This text addresses the practical and theoretical implications that provide a rational background for future research projects operating in this field.

**Keywords:** information system, Information system for accounting, building information modelling, communication technology, products and services, business processes

### 1. Introduction

The oil industry, which, in turn, has great power in the overall development of a country like Iraq in terms of its economy, suffers from uncertainty and complexity. There are cases when construction sided with other industries, mainly construction, and in particular, Building Information Modelling (BIM) Manufacturing (Darko et al., 2020; Olanrewaju et al., 2020; Sompolgrunk et al., 2023). The oil business in Iraq has been implemented to deal with different problems: economic instability, market extension, high levels of competition, technological progress, changes in consumer and social demands, and the presence of the workforce. A catalyst for IS in this industry is the improvement of operative performance, considered the most important feature (Huo et al., 2021; Mellado & Lou, 2020). The use of the IS in Iraq deals with public and commercial contracting works. Nevertheless, there remain difficulties to be overcome, including slow reporting, slip-ups in the transactions,



inefficient ways to generate reports, slow processing of information, and difficulties in paperwork. All these things prolong the enterprise of managerial accountancy. This suggests that before designating adequate information systems that encompass all phases of financial performance reporting, BIM profitability must be assessed.

However, the data from prior research still emphasises the fact that it is of high importance for the oil sector. On the other hand, the amount of IS used for the time being in Iraq has reached the intermediate level, and it still needs to be fully practical (Abdeldayem & Aldulaimi, 2023). In addition, such types of analysis are needed for the purpose of grasping not just the drivers but also which elements have different degrees of effect on the adoption of information systems (IS) and the level of profit for Building Information Modelling (BIM). In this regard, controls are fundamental in the context of constantly changing oil prices and staff behaviour, like attitude and preferences (Ahamad et al., 2022). AIS culture of diversity in organisations, as well as a close look into the new opportunities for BIM profitability with the help of AIS in Iraqi oil organisations, is also considered in this research. Based on that, the target of my study is to assess the role of different aspects pertaining to the installation of information systems, e.g. communication technologies, products and services, and business processes, on profit-making in Building Information Modelling (BIM). The study also considers the role of AIS as a mediating agent. This research is aimed at helping hydrocarbon companies come up with an IT strategy that takes into account the considerations of Building Information Modeling (BIM) to maximise the resultant profitability of BIM. Also, the research offers an international perspective on the link between IS and AIS and the profitability of the oil sector (Brachten et al., 2021).

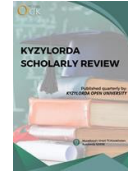
## **2. Literature review**

### **2.1 Information System**

IS is one of the most important mechanisms used to improve operational efficiency and decision-making in organisations, e.g. reporting critical data. Alsudani et al. (2023) define the system of information (IS) as a combination of software and hardware used to monitor these financial processes as it allows critical tasks to be done, such as the production of an annual budget, performance evaluation of monthly reports and financial statements. Information systems (IS) are at the core of the managerial decision-making process as they are a set of computer systems that provide business information and support the decision-making process. These systems help establish the basis for the development of strategies and eliminate existing issues within corporate settings. However, they not only play a supporting role but are also a part of the process, which is very important. It utilised the approach introduced by Gayialis et al. (2022); all the information systems (IS) are given by three basic elements: communication technologies, products or services, as well as business processes. All of those elements have a natural key impact on propping up the economic revenues that BIM can bring to the petroleum sector market.

### **2.2 The Impact of IS on Building Information Modeling (BIM) Profitability**

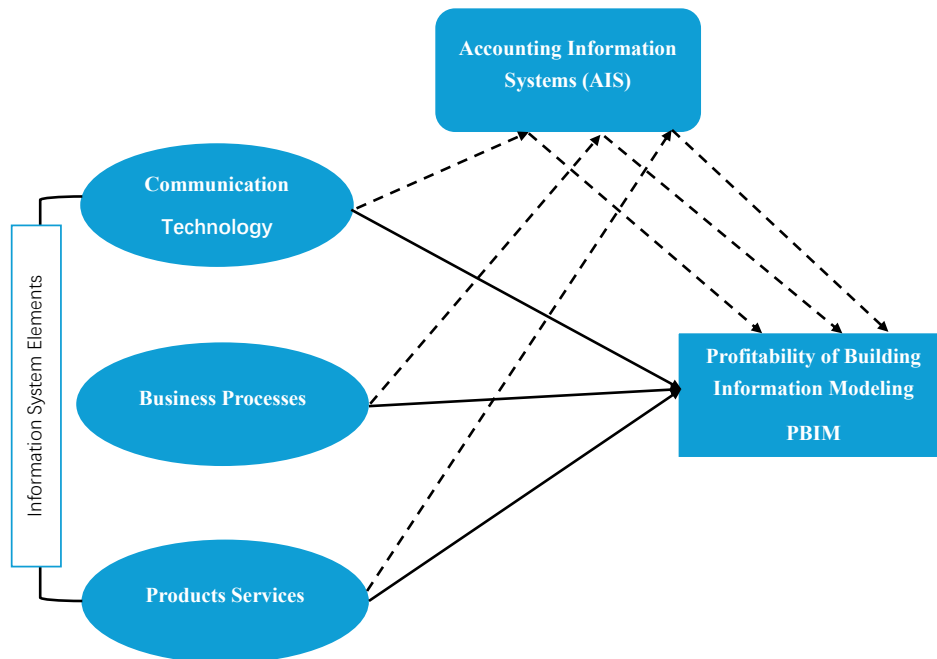
Research constantly demonstrates a favourable association between the installation of Information Systems (IS) and increased profitability in Building Information



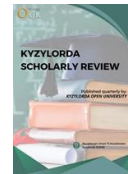
Modelling (BIM) within the oil business. Research suggests that the implementation of modern information systems in oil firms results in substantial enhancements in profitability, as indicated by studies (Ngobe, 2020). Therefore, it can be observed through Yiu et al. (2021) Putting an information system in place that is suitable for financial reporting positively influences business intelligence and management profitability. In addition, technology helps to enrich the profits as it hints that quality data processing operations are vital for firms who want to optimise their Building Information Modelling finance operations (Pan et al., 2024). The message generated from the above study results is that information systems will lead to the provision of strategic information that can set any given company apart from its performance.

**2.3. Mediatory AIS in BIM Profitability**

The objective of this part is to establish the relationship between AIS and BIM profitability and focus on how the operations of IS influence the adoption of IS and profitability in the BIM. Prior relevant research demonstrated the fundamental role of AIS in improving the efficiency of information systems that allowed to achieve profits in BIM (Al-Hashimy, 2022a). Even though we know that the mediaticity level of AIS has been acknowledged, the empirical evidence reveals that the degree of AIS influence could be different on every occasion. Take the connection between financial preparedness and the introduction of new products as an example. It is characterised by better AIS functioning, resulting in an increase in profitability. Nevertheless, there is disagreement among studies, as some demonstrate inconclusive findings about the usefulness of AIS, depending on various theoretical frameworks, such as Agency theory (Al-Hashimy et al., 2022; Alharasis et al., 2023). This research seeks to investigate the connection further, suggesting that AIS not only facilitates but also greatly improves the financial influence of IS implementations on BIM in the Iraqi oil business. The following Figure 1 show depicts a conceptual model that displays the hypothesised relationships.

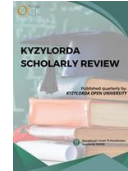


**Figure 1 depicts a conceptual model that displays the hypothesised relationships.**



**Table 1. Summary of related studies and their findings**

Previous studies	Results
Asian et al. (2019)	Higher usage of IS implementation factors leads to higher companies' PBIM.
Minaee et al. (2021)	The positive link between the perceived benefit of IS financial statement and companies' PBIM.
Sahibzada et al. (2019)	A positive relationship between reports preparation decision-making and companies' PBIM.
Al-Bataineh and Gallagher (2021)	The oil industry has a low degree of efficiency when compared to other industries.
Röck et al. (2020)	The oil industry has unacceptable levels of productivity and poor PPIM due to its inefficiencies.
Majid et al. (2020)	There exists a positive relationship between products and services and companies' PBIM.
Aljanabi (2018)	Suitable alignment between PBIM and IS can assist companies in enhancing their long-term profitability and value.
Gangi et al. (2020)	products and services are an important issue to determine AIS with regards to its impact on companies' profitability
Abusweilem and Abualoush (2019)	There is a positive relationship between (communication technology) and AIS in Jourdan companies.
Alabdullah et al. (2019)	Positive link between external pressure and AIS
Pedras et al. (2020)	increases construction profitability by controlling organisational members' response repertoires in their working environments
Suarez and Montes (2019)	Shows a positive significance in some countries and a negative significance in other countries.



### **3. Methodology**

#### **3.1 Sample and data collection procedure**

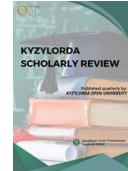
This study utilised non-probability sampling to gather data from oil businesses located in Southern Iraq. The samples were obtained from the directory issued by the Al-Alaqi South Oil Company, which was released in partnership with the Iraqi Ministry of Planning and OPEC. The directory provides essential information, including the company's history, CEO, year of establishment, and yearly operations. It specifically focuses on organisations that are likely to have adopted advanced information systems (Jöhnk et al., 2021). We specifically focused on managers, executive directors, or senior managers as participants. We reached out to them through email and phone to inform them about the purpose of the study and obtain their consent after providing them with all the necessary information. Data was collected between June and November 2021 using a standardised questionnaire. The sample size was obtained using the gamma exponential approach, which suggests that a minimum of 146 participants is needed to reach a power of 0.8 and to detect a significant route coefficient of at least 0.197 (Abbasi et al., 2021; Al-Hashmy et al., 2022). Indeed, our response rate has reached 82%. My survey team received 574 survey forms back out of 700. This response rate is exactly at the level with what is considered the minimum threshold level.

#### **3.2 Questionnaire methodology and development**

The use of constructs taken from prior studies made it possible to analyse the effect of certain information systems components (communication technologies, products and services, and business processes) on the profitability of BIM (Building Information Modeling). The forms of co-construction of these compounds were conceptualised around the model provided by Hossard et al. (2022). The level and method of the enterprise's profitability indicators were tied up in the study being conducted by Amponsah-Kwatiah and Asiamah (2021). They hewed to the size and various other characteristics of a nuclear family utilising seven factors on a 5-point Likert scale. Table 1 indicates that the study will include detailed descriptions of the art constructions and their origin. For this goal to be achieved, the researchers performed a pilot test in order to assess the congruence of the constructs, whether the respondents were able to comprehend the questionnaire items, and what amount of time had been taken to finish the questions. The pilot phase was an instrumental catalyst for the enhancement of the key areas that our questions have achieved, namely clarity and dependability (Alami et al., 2023). The composite reliability estimates for the constructs of Communication Technology (CT), Products and Services (PS), Business Processes (BP), and Profitability of BIM (PPIM) were 0.911, 0.877, 0.876, and 0.881, respectively. These values indicate that all measures have a high level of reliability, as confirmed by the reference for reliability standards.

#### **3.3 Methods of data analysis**

According to the research methodology used, after the data analysis, we will determine the outcomes of the study through the application of the Partial Least Squares Structural Equation Modelling (PLS-SEM) method with the assistance of WarpPLS version 8 software. This specific method of SEM analysis is indeed advisable due to its robust and full-proved nature, as attested by scholars such as Lin et al. (2020). Besides this, Hasan and Bao justified the necessity of using PLS-SEM for the data astray. The



analysis was carried out in two primary phases. The first phase comprised the interrelationship between two important components: the measuring model and the structural model. The approach of PLS, which is factor-based, has been used in confirming the measurement model's reliability. Such a methodology would lead to more accurate composites with lower levels of errors in the measurement, a technique that has evidence backed by studies that date back to Wang et al. (2023). Fortunately, the "stable 3" method, which undertakes the P value of the parameters, had been chosen since it proved its resistance in scientific computations in PLS-SEM. The warp three option ultimately consists of obtaining the moduli and p-values as well as allowing for the nonlinear associations between variables as a factor that may have affected the model and confirmed this technique by cutting trees around the huts and further along the fence line. The mediation analysis regarding the transmission technique was conducted in such a way that particular attention was paid to the indirect linkages and their effects. This approach is favoured and stretched out further in subtle details with Turner et al. (2021) contribution. The major hypothesis under exploration is highlighted that the direct link between the Information System Components and the profitability of Building Information Modelling (BIM) runs via the Accounting Information System (AIS). By using this method, it first focused on the opposite impacts and strong absence of a direct link to also comply with the previous analysis abstraction of the mediators by Koschate-Fischer and Schwille (2021) and the mediation approach provided by Jung et al. (2022). The steady use of the three functions in WarpPLS guarantees the performance of these methods, which are later evaluated with satisfactory outcomes.

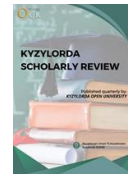
## **4. Results**

### **4.1 Respondents' demographics**

This study involved 150 participants selected from a total of 306 firm representatives. The participants had a wide range of work experience, with 8.9% having 5 to less than ten years of experience, 73.9% having 10 to less than 15 years of experience, and 33.2% having 15 to less than 20 years of experience. The majority of participants (87.6%) had more than ten years of experience in the field. The educational background of the participants revealed that 88.9% held at least a bachelor's degree, with 52.3% having a master's degree and 2.3% holding a doctorate. The table also shows that the majority of respondents (51.2%) were in the accounting field, followed by 22.0% in Business Administration, Finance, and banking, and 19.3% in another field.

### **4.2 Measurement model analysis**

The evaluation of the reflective measurement model encompasses the analysis of reliability, convergent validity (indicator reliability/outer loading and average variance extracted), and discriminant validity. The stability of the constructs was assessed by determining their Composite Reliability (CR) coefficients. The results shown reveal CR values of 0.952, 0.811, 0.821, 0.655, 0.785, 0.544, 0.644, 0.866, 0.932, 0.866, and 0.733, respectively, for each construct. These values surpass the recommended minimum of 0.70, according to Hair et al. (2017), implying that all constructs in the study possess adequate composite reliability. To establish convergent validity, each



construct must account for at least 50% of the allotted indicators' variance (AVE  $\geq 0.50$ ) Alhassan and Adam (2021). Table 2 reveals that the Average Variance Extracted estimates for all the study's constructs are greater than 0.5, thus meeting the threshold value for convergent validity. Discriminant validity refers to the extent to which the analysed constructs are different from one another. Rönkkö and Cho (2022). In PLS-SEM analysis, there are three criteria for assessing discriminant validity: the cross-loading criterion and the Rasoolimanesh (2022) measures or the Heterotrait-Monotrait ratio of correlations (HTMT) (Al-Hashimy, 2022b). Table 3 displays the results of the Fornell and Larcker criterion, which shows that the constructs in the model have adequate discriminant validity (Fornell & Larcker, 1981), as the square root of AVE (diagonal) is greater than the correlations (off-diagonal) for all reflective constructs.

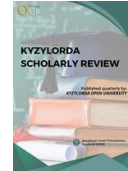
To establish discriminant validity by checking the cross-loading of the indicators, each indicator should load on its assigned factor, and the loadings on other factors should be low (Cheung et al., 2023). Evidently, from the factor facilitation shown in appendix I, the indicators at high load the most strongly on their factor constructs and not on their rival constructs, thus implying that Construct discriminant validity has been achieved.

### 4.3 Structural model analysis

In order to ascertain the credibility of the results of the structured model provided only through partial least squares structural equation modelling (PLS-SEM) by performing a set of six tests (Sarstedt et al., 2021). The tests are aimed to scrutinise various components of the structural model that include conditions of collinearity, significance and relevancy of models' parameter estimates, the degree of R<sup>2</sup>, the size of the effect size (f<sup>2</sup>), the capacity of the model to predict (Q<sup>2</sup>), and the size of the model learning effect (Q<sup>3</sup>). To remove the LMCT that can distort results by reducing the power of variables in the model that have causal effects and for that purpose tests were carried out Kock (2021), and the presence of collinearity between the constructs was assessed through the VIF index.

### 4.4 Hypothesis Testing

The hypothesis testing results indicated that communication technology (CT), products and services, business processes and company profitability are statistically insignificant at  $P > 0.05$ , as illustrated by Figure 2 and Table 5. So, we can conclude that the impact of CT, products and services, as well as business processes on company profitability was found to be non-significant ( $p=0.274$ ,  $\beta=0.274$ ,  $p=0.26$ ,  $\beta=0.042$ ,  $p=0.056$ ,  $\beta=0.053$ ). However, the research revealed that the effect of the Accounting Information System (AIS) as a mediator of the relationship between communication technology and company profitability, communication technology and PBMI, and products and services and PBIM were statistically significant and supported H<sub>4</sub>, H<sub>5</sub>, and H<sub>6</sub>. The study took on the meaning of effect size from interpretation (Lovakov & Agadullina, 2021). By taking the observation from Table 5, we can notice that the effect size (f<sup>2</sup>) of the mediating effect of AIS on the relationship between communication technology and product and services and PBIM (CT → AIS → PBIM) is large and greater than 0.35, and the effect sizes of the mediating effect of AIS on the relationship between business processes and PBIM (BP → AIS → PBIM), and that of



the mSpearfishing AI was found to have a medium effect size, too. Moreover, the remaining findings represent effects somewhat from the small ( $0.02 > f^2 < 0.15$ ) to very minute ( $f^2 < 0.02$ ).

The Variance Accounted For (VAF) approach was used to analyse the mediating effect in this study. According to Tosun et al. (2021), a VAF estimate above 77% indicates full mediation, while a value less than 23% implies no mediation, and a value between 23% and 77% suggests partial mediation. The results showed that the TC, AIS, PBIM relationship had a VAF value of 77.9%, the PS, AIS, PBIM relationship had a VAF value of 82.8%, and the BP, AIS, PBIM relationship had a VAF value of 88.2%. These results suggest that there is full mediation in each of the relationships.

## 5. Discussion

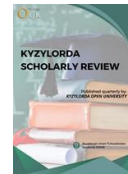
The research objective has been accomplished so far, and the results have shown that a significant correlation between oil company profitability and IS processes is absent. The IS processes consist of the IS cycle dimensions, communication technology, products and services, and business operations. The groups that can assess their ICT capabilities for innovation are able to progress the IS projects while keeping in mind large investments being made in terms of time, money, and human resources. The results reveal that senior managers need to assess innovation's capacity, taking into account all the implications in IS development. By establishing an Ishikawa diagram, they are able to fit the systems undertakings to their institution's capacity for ICT and could thus have better chances for success. The outcome of this objective is that ICT, for all other IS processes, acts fully as a mediator except for communication. One of the pivotal contributions of ICT in the framework of IS programmes is seen to be that it has an established leading role in the fruitfulness of said programmes. Providing quantifiable evidence from research on the mediating role of ICT in both these processes (IS) and oil companies shows that oil companies must be ICT-enabled to successfully implement IS and, hence, higher profitability.

First and foremost, all significant factors should be conclusively defined in order to boost the chances of success in Information Systems (IS) programs. The relationship between oil industry processes and organisational profit is highly complicated; this field is a part of several multidisciplinary confines. This study explored the dependence IS on processes, ICT, and profitability upon viewing it from different directions, and the result showed that the more developed the previous two, the more the profitability of the oil companies in Iraq. IS sponsoring organisations must determine the monetary benefits of IS investment through some measurable profit improvements that can make a difference in facilitating the allocation of resources, particularly amidst stiff competition. The connection between IS and ICT serves as a possible argument that each ability only separately may not result in winning a competitive advantage in oil companies within Iraq. Furthermore, the study assumes a strong correlation between ICT and IS bucks, which increases the chance for managers to run a successful change program. The study emphasises that IS processes unaided by ICT cannot really ensure performance through the actions taken.

## 6. Contributions of the Study

This study makes both theoretical and practical contributions to the existing body of knowledge. It addresses gaps in previous studies regarding the relationship between Information Systems (IS), Information and Communication Technology (ICT), and oil





company profitability. The practical implications offer solutions and clarification for the industry's challenges. The theoretical and practical implications of the research will be discussed below

### **6.1 The Theoretical Significance of the Study**

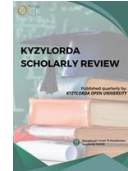
This work supplements the extant literature on strategic accounting in the construction industry and Information Systems by making several important theoretical propositions which are based on different information system theories; literature reviews about information systems, information and communication technology and company profitability oil, identifying some gaps of research in this way. To begin with, it sums up all the evidence in the existing literature related to IS, ICT well, and oil company profitability by helping to identify new research areas. In doing so, a synergy-based ground-up theoretical framework connecting IS, ICT, and oil company profitability has been put together, which is one of the first models of its kind. The study also loosens conventional research by looking at the impact of ICT on IS to measure its profitability, whereas earlier studies explored the impact of IS on profitability. Besides this, it extends IS to focus on each of the components of communication, becoming necessary technology, products and services, and their effect on oil company profit. The Success of Oil Firms. This publication also discovered the need for more empirical studies in the existing literature on the synchronisation of IS, ICT, and profit-based innovation management in developing countries. Such gap has been overcome by a questionnaire survey of companies in a number of sectors in Iraq towards the testing of the theoretically proposed model. The contribution of the article lies in the major role played by computer applications in oil company profitability.

### **6.2 Contributions to Practice**

According to the findings reported by this study, none of the three IS contexts lead to the companies' enhanced performance. Therefore, this points out that the oil companies need to focus more than just the IS in order to bring about profitability. Additionally, from the outcome, it is evident that IS do not influence the relationship between AIS and oil company profitability because AIS can mediate the relationship between IS and oil company profitability. Thus, this highlights that for IS implementation, both IS processes and AIS characteristics have to be taken into consideration for successful adoption. Thus, IT adoption is a necessary condition for organisations to maximise the gains of PBIM. Utilisation of AIS must be a strategy that is pertinent to the AIS, the implementation of the information system programme or will be experienced as challenging by the users. This means that AIS is important since it guarantees the success of IS initiatives and profitability for oil companies in the long run.

### **7. Study Limitations and Probable Future Research Directions**

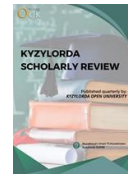
While the study still has some shortcomings, it is important to note them for better planning. First, the result of the research is influenced by the specific context of its location in Iraq; therefore, it may be irrelevant to other contexts. It could be useful to replicate studies in various countries to control for the results and compare them to one another. In this study, an organised questionnaire was used, which might have influenced the responses. If qualitative data and mixed methods were incorporated in future studies, the results would become more comprehensive. Besides that, the study only incorporated the R2 value as a variable that might be affected by organisational



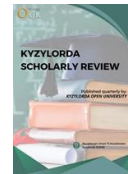
size, technology complexity, and workforce experience. In order to form a more vivid bigger picture for ourselves, research on the trajectory of these factors should be considered in the future.

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