

# The Role of Actor- Network Theory in the Effective Implementation of Activity- Based Costing: Case Study in Construction Company

**Kamilah Almousa**

PhD Candidate at King Saud University,  
College of Business Administration, Riyadh, KSA  
[442204149@student.ksu.edu.sa](mailto:442204149@student.ksu.edu.sa)

**Dr. Mohamed Ibrahim Almofleh**

Assistant Professor of Accounting at King Saud  
University, College of Business Administration,  
Riyadh, KSA  
[malmofleh@ksu.edu.sa](mailto:malmofleh@ksu.edu.sa)

---

## Abstract

This research explores the adoption of Activity-Based Costing (ABC) in a Saudi Arabian construction company, highlighting its necessity due to the inadequacies of traditional cost accounting systems in the face of globalization and technological advancements. While earlier research has examined the adoption of ABC across different global settings, its implementation within the construction industry remains a novel area of study. This research examines the utilization of the ABC system within a construction firm, with a particular emphasis on the factors that impacted the implementation. A case study has been conducted to obtain a comprehensive image of the firm's experiment with ABC adoption. Data were gathered through interviews with seven key personnel engaged in the ABC implementation process, offering insights into the factors influencing its adoption. Utilizing Actor-network theory (ANT), the research traced vital actors, both human and non-human, as they played roles in adapting ABC, revealing a complex interplay of diverse actors that enabled the effective integration and operation of the ABC system. Underscoring the complexity and the necessity of a coordinated network of actors to effectively adopt sophisticated costing methods such as ABC in the construction industry, this research contributes valuable insights. It suggests that the success of such implementations depends heavily on a well-coordinated network of actors who can dynamically interact and adapt to the evolving organizational and technological landscape.

**Keywords:** Traditional Cost Accounting Systems, Activity-Based Costing (ABC), Actor-Network Theory (ANT), Qualitative Case study, Construction Company

---

Received on 21/8/2024, accepted on 2/9/2024.

## دور نظرية الشبكة الفاعلة في التطبيق الفعال لنظام التكاليف على أساس

### الأنشطة: دراسة حالة لشركة مقاولات

#### ملخص البحث

يتناول هذا البحث تبني نظام التكلفة على أساس النشاط (ABC) في إحدى شركات المقاولات في المملكة العربية السعودية، مع تسليط الضوء على ضرورته بسبب عدم كفاية أنظمة المحاسبة التقليدية للتكاليف في مواجهة العولمة والتقدم التكنولوجي. وفي حين تناولت الأبحاث السابقة تبني نظام التكلفة على أساس النشاط (ABC) في مختلف البيئات العالمية، فإن تنفيذها داخل قطاع المقاولات يظل مجالاً جديداً للدراسة. ويستقصي هذا البحث استخدام نظام التكلفة على أساس النشاط (ABC) في شركة مقاولات، مع التركيز بشكل خاص على العوامل التي أثرت على التنفيذ. وقد أجريت دراسة حالة للحصول على صورة شاملة لتجربة الشركة مع تبني نظام التكلفة على أساس النشاط (ABC). وقد تم جمع البيانات من خلال إجراء مقابلات مع سبعة موظفين رئيسيين مشاركين في عملية تنفيذ نظام التكلفة على أساس النشاط (ABC)، مما يوفر رؤى حول العوامل التي تؤثر على تبنيه. وباستخدام نظرية الشبكة الفاعلة (ANT)، تتبع البحث الجهات الفاعلة الحيوية، سواء البشرية أو غير البشرية، التي لعبت أدواراً في تكييف نظام التكلفة على أساس النشاط (ABC)، وكشف عن تفاعل معقد بين الجهات الفاعلة المتنوعة التي مكنت من التكامل الفعال وتشغيل نظام التكلفة على أساس النشاط (ABC). إن هذا البحث، الذي يؤكد على تعقيد وضرورة وجود شبكة منسقة من الجهات الفاعلة لتبني أساليب التكلفة المتطورة مثل نظام التكلفة على أساس النشاط في صناعة المقاولات، يساهم في تقديم رؤى قيمة. ويشير إلى أن نجاح مثل هذه التطبيقات يعتمد بشكل كبير على شبكة منسقة من الجهات الفاعلة القادرة على التفاعل والتكيف بشكل ديناميكي مع المشهد التنظيمي والتكنولوجي المتطور.

**الكلمات المفتاحية:** أنظمة محاسبة التكاليف التقليدية، نظام التكلفة على أساس النشاط، نظرية

شبكة الجهات الفاعلة، دراسة حالة نوعية، شركة المقاولات

## 1. Introduction

In the evolving landscape of management accounting, traditional cost allocation methods have faced increasing criticism for their inability to provide accurate and actionable insights in contemporary business environments. As organizations grapple with the complexities of globalization, technological advancements, and diversified product offerings, the need for a more precise allocation of indirect costs to products and services has become more apparent (Kaplan, 1994). In response, ABC emerged in the late 1980s as a revolutionary approach to cost management, explicitly addressing this need by offering a detailed analysis of organizational activities for a more accurate cost allocation (Kaplan, 1994).

Actor-network theory (ANT), developed by Bruno Latour, Michael Callon, and John Law, provides a robust analytical framework for understanding the intricate networks that underpin social and technological systems (O'Connell et al., 2014). Originating from the social study of science and technology, ANT emphasizes the interconnectedness of both human and non-human actors in shaping organizational practices and knowledge construction. This theoretical perspective is particularly valuable in exploring the adoption and implementation of ABC, as it highlights the dynamic interactions and relationships that influence cost management innovations. Despite its theoretical advantages and practical benefits, adopting ABC has faced various challenges. These include the complexity of the system, significant implementation costs, and organizational resistance. Understanding the factors that influence the successful implementation of ABC is crucial for organizations seeking to enhance their cost management practices and maintain a competitive edge.

This research delves into implementing the ABC system within a Saudi construction company, aiming to identify the key factors that impact its adoption. By addressing what influences the implementation of ABC, this study contributes to the broader discourse on cost management innovations and their practical applications in diverse organizational contexts. The paper is

organized as follows: Section (2) provides a background of the literature on cost accounting systems development and in particular ABC. This is followed by section (3), which discusses the adopted theoretical framework namely ANT. Section (4) discusses the methodology and analysis approach. Section (5) discusses the findings of the presented case study. Finally, section (6) offers a discussion of the findings and the study's main limitation.

## **2. Literature review**

Traditional management accounting systems tend to allocate highly aggregated cost information to products by simplistic and arbitrary methods, often unrelated to demands made by the products on organizational resources (Swenson, 1995). The traditional costing systems were designed to allocate indirect costs to products, with an emphasis on direct labor; this results in inaccurate indirect costs due to imprecise allocation criteria (Quesado & Silva, 2021). These systems were developed during a time when raw materials and direct labor were the primary factors of production, technology was deemed stable, and the range of products offered to the market was limited (Quesado & Silva, 2021). In the contemporary business landscape, traditional cost accounting methods have become increasingly inadequate for delivering precise insights into costs and pricing (Quesado & Silva, 2021). The contemporary demands of organizations are not adequately addressed by conventional information and management control models. This inadequacy primarily arises from the rapid advancement of technology (Quesado & Silva, 2021; Enes & Koşan, 2024), the globalization of markets, the proliferation of products and services, and the overall globalization of the economy (Quesado & Silva, 2021). This gap is exacerbated by the fast-paced evolution of business landscapes, intensified competition, and rising consumer expectations (Quesado & Silva, 2021). Consequently, traditional cost accounting systems have proven insufficient in fulfilling the requirements of contemporary business management (Baykasoğlu & Kaplanoğlu, 2008).

By 1987, it was commonly recognized that traditional methods of cost allocation, which relied on fundamental metrics such as direct labor or sales revenue, or direct cost methods that disregarded overhead costs when determining the costs of products, services, and clients, were outdated and no longer effective (Kaplan, 1994). The changes in the competitive landscape during the 1980s necessitated a reassessment of conventional cost accounting and management control mechanisms (Kaplan, 1984). As new technologies and advanced production methods emerged, competition and customer demand increased, leading to a decrease in the importance of direct labor costs in the overall production cost of organizations (Quesado & Silva, 2021).

Consequently, indirect costs became a significant component of most organizations' cost structures (Quesado & Silva, 2021). In order to attain competitive success, companies must effectively leverage both tangible and intangible resources, swiftly adjust to environmental shifts, and anticipate and meet evolving consumer demands ahead of rivals (Quesado & Silva, 2021). Sustaining a competitive edge hinges on the capacity to deliver top-notch products or services rapidly and cost-effectively (Baykasoğlu & Kaplanoğlu, 2008). Organizations in today's business environment require reliable and timely information to stay ahead; therefore, having an appropriate costing system is of utmost importance (Quesado & Silva, 2021). It enables organizations to manage their resources effectively, control costs, and achieve efficient management (Quesado & Silva, 2021). In the 1980s, the activity-based costing system emerged to address the limitations of traditional costing methods in the face of economic and technological changes (Quesado & Silva, 2021). The initial publications by Cooper & Kaplan caused ABC to quickly disseminate across the United States, Canada, and Europe (Gosselin, 2007). The interest in ABC grew rapidly in the early 1990s among management accounting professionals (Gosselin, 2007). It has been adopted and implemented by several private sector organizations as a cost management innovation (Gosselin, 2007).

Numerous organizations in the USA, UK, and Canada organized workshops, training sessions, and conferences to discuss ABC (Gosselin, 2007). Many scientific publications have extensively researched ABC (Allain & Laurin, 2018). The United States takes the lead in the number of papers and citations (Sanchez-Rebull et al., 2023). Following suit are the United Kingdom, Italy, and China, respectively, regarding the number of articles published on ABC (Sanchez-Rebull et al., 2023). Also, it is noteworthy that authors hailing from 83 developed and developing countries have contributed to ABC, which confirms its wide-ranging reach and recognition (Sanchez-Rebull et al., 2023). ABC has been studied primarily through case studies in various sectors (Sanchez-Rebull et al., 2023). Healthcare and manufacturing are two sectors that have seen a recent uptick in the application of ABC (Sanchez-Rebull et al., 2023). This indicates that the ABC system has a strong theoretical foundation and can be used in a variety of organizations (Sanchez-Rebull et al., 2023). In recent times, the field of management accounting systems has witnessed a swift pace of change, and few innovations have garnered as much attention as ABC (Swenson, 1995). Many scholars and professionals in the field of management accounting believe that ABC is the most significant development in the 20<sup>th</sup> century (Gosselin, 2007). It has remained a subject of interest for both researchers and practitioners even after more than 30 years since its introduction (Sanchez-Rebull et al., 2023).

This shift in emphasis, noted by Kaplan (1994), moved away from traditional cost allocation methods towards pinpointing cost flows stemming from organizational expenditures on supply resources. These resources create the capability required to perform different organizational activities (Kaplan, 1994). An ABC system can provide a more accurate representation of product costs compared to traditional costing systems (Tran & Tran, 2022; Bhimani & Pigottt, 1992). This is because the former system attributes indirect costs, such as factory overhead and corporate overhead, to individual activities and then to the products that require these resources (Cooper, 1988). The ABC system focuses on activities that consume resources and cause costs (Tran & Tran, 2022) rather than products that consume activities (Quesado & Silva, 2021).

The determination of product costs in the ABC system is based on the activities performed by a company (Sanchez-Rebull et al., 2023). The system assumes that these activities consume the company's resources rather than the products themselves (Sanchez-Rebull et al., 2023). By identifying these activities, the system can allocate costs more accurately, resulting in a reduction of indirect costs and making them direct costs with ABC (Sanchez-Rebull et al., 2023). Consequently, products consume these activities along with other direct costs (Sanchez-Rebull et al., 2023). The costs of activities are distributed among the products that consume them through cost drivers, which can be any unit that links activities and costs, such as the number of labor hours or completed orders (Sanchez-Rebull et al., 2023). In other words, ABC systems allocate overhead costs to multiple cost pools and trace them to products based on activity measures (Swenson, 1995). This creates a cause-and-effect relationship between activities and resource consumption that supports product costing and cost control (Swenson, 1995).

Today, when we examine ABC, it presents itself as a pre-made costing method renowned for its reliability and assurance (Jones & Dugdale, 2002). Beyond being a mere accounting system, ABC stands as a strategic tool crucial for corporations (Cooper, 1988). The decisions managers face, whether in pricing, marketing, or product design, all hinge on a precise understanding of product costs (Cooper, 1988). Indeed, without this foundational knowledge, effective decision-making becomes an unattainable feat (Cooper, 1988). Furthermore, ABC offers a strategic lens through which companies can assess their strengths, weaknesses, and avenues for growth (Quesado & Silva, 2021). ABC's costing method can be helpful in several ways, such as providing accurate cost calculation and facilitating better decision-making by offering reliable information (Quesado & Silva, 2021). It can also help organizations improve their overall performance by making them more efficient and effective (Quesado & Silva, 2021; Tran & Tran, 2022). By identifying the areas where resources are being spent and where the money is being earned or lost, ABC costing method can help organizations determine which activities add value to their products or services and which ones do not (Quesado &

Silva, 2021). In addition, companies can use ABC in routine planning, control (Velmurugan, 2010), and decision-making where management needs precise, reliable, and fast cost information (Tran & Tran, 2022), especially during economically uncertain and inflationary times (Sanchez-Rebull et al., 2023). ABC can be particularly attractive to companies as it provides detailed and valuable cost information useful for decision-making (Sanchez-Rebull et al., 2023). Utilizing an ABC system can result in significantly diverse assessments of product costs and profitability in comparison to more basic methods (Cooper, 1988). Kaplan (1994) argues that managers can enhance their organization's profitability by leveraging the insights provided by ABC information. However, Gosselin (1997) raises a pertinent question: if ABC offers demonstrable benefits, why aren't more firms actually employing it?

There are a variety of possible answers to this paradox (Kennedy & Graves, 2001). The current research suggests that ABC might not suit every company, as highlighted by Kennedy and Graves in 2001. They pointed out that successful implementation hinges on various factors (Kennedy & Graves, 2001). Gosselin further supports this notion, emphasizing that the adoption and execution of ABC are shaped by variables like organizational size, strategic focus, environmental unpredictability, and product range (2007). According to Gosselin (1997), many organizations had not given serious thought to ABC, and a number of organizations that made the decision to adopt and execute it in the 1990s have since abandoned it. This trend may stem from a limited understanding of the practical applications of accounting and control systems, as noted by Malmi (1997).

Additionally, there has been a notable lack of clarity within the management accounting community about the exact nature of ABC, as further discussed by Gosselin in 2007. This confusion has been further corroborated by survey studies, indicating a widespread misunderstanding of ABC's fundamentals (Gosselin, 2007). The prevalence of confusion, coupled with methodological challenges, such as ABC, was found to be more complex than expected (Gosselin, 2007) and consumed a lot of time (Tran & Tran,



2022). Velmurugan (2010) highlighted that the perceived complexities in administering and managing the technical aspects of ABC often lead to its rejection by businesses. Maurice and Marc have also emphasized the complexity of ABC in their analysis from 2022. They found that the complexity of ABC was initially underestimated, which led to difficulties in its adoption (Maurice & Marc, 2022). Implementing ABC could present challenges beyond its inherent complexity (Maurice & Marc, 2022). Research by Swenson (1995), Enes & Koşan (2024), Kennedy & Graves (2001), and Quesado & Silva (2021) highlighted the significant implementation costs associated with ABC adoption, not to mention that its maintenance in dynamic environments can be financially burdensome (Hoozée & Hansen, 2014). Despite these financial investments, the efficacy of ABC in enhancing performance or adding value to a company is not always guaranteed (Gosselin, 2007). Gosselin's study (2007) underscored this uncertainty, suggesting that the implementation of ABC does not consistently translate into improved performance or increased company value. Kennedy & Graves (2001) further argued that there's insufficient evidence to directly link ABC implementation with enhanced shareholder value or firm profitability. This lack of concrete proof, along with substantial investment requirements, might make some companies hesitant to embrace ABC (Kennedy & Graves, 2001).

Another implementation challenge associated with ABC, as suggested in various studies, is resistance (Bhimani & Pigott, 1992; Gosselin, 2007; Jones & Dugdale, 2002; Major & Hopper, 2005; Malmi, 1997; Shield, 1995) rather than technical or application flaws (Malmi, 1997). Organizational issues, specifically resistance, have been identified as the main cause of implementation problems in ABC, rather than technical flaws in the system or its application (Velmurugan, 2010). The resistance to accounting changes, specifically to ABC, is commonly attributed to a complex interplay of factors (Velmurugan, 2010). Economic rationales and political motives often dictate the acceptance or resistance to such changes (Velmurugan, 2010). Organizational culture also plays a critical role (Malmi, 1997; Velmurugan, 2010). Additionally, Malmi (1997) identified other influential factors, such as

the perceived costs and benefits of implementing ABC and power dynamics within the organization, suggesting that resistance is fundamentally rooted in the organization's structure. However, the success or failure of ABC is strongly influenced by various behavioural and organizational factors, which can vary in their significance across different stages of the process (Velmurugan, 2010). Culture can also play a crucial role in determining the most effective implementation strategies for ABC (Velmurugan, 2010). Many researchers have emphasized that the successful execution of ABC relied heavily on having the support of top management (e.g., Allain & Laurin; 2018; Anderson, 1995; Anderson & Young, 1999; Briers & Chua, 2001; Gosselin, 1997; Gosselin, 2007; Gosselin & Journeault, 2022; Major & Hopper, 2005; Malmi, 1997; Quesado & Silva, 2021; Shields, 1995; Swenson, 1995). Cooperation from several departments, as well as the support of business leaders and employees, also influence the successful implementation of ABC (Tran & Tran, 2022).

Training is another important factor in determining the success of ABC implementation (Anderson, 1995; Anderson & Young, 1999; Gosselin, 1997; Gosselin, 2007; Kennedy & Graves, 2001; Major & Hopper, 2005; Malmi, 1997; Quesado & Silva, 2021; Shields, 1995; Swenson, 1995). Many researchers have explored firms experiment with ABC in various sectors such as pharmaceutical firms (Tran & Tran, 2022), manufacturing (Anderson, 1995; Bhimani & Pigott, 1992; Swenson, 1995), restaurant (Enes & Koşan, 2024), land transportation (Baykasoğlu & Kaplanoğlu, 2008), telecommunications company (Major & Hopper, 2005) local government (Gosselin & Journeault, 2022). However, ABC implementation in construction companies remained under-explored. This research explores the implementation of the ABC system in a Saudi construction company by highlighting the factors that influenced the implementation. By answering the research question, what are the factors influencing the implementation of Activity-Based Costing?

### **3. Theory**

ANT is an analytical framework developed by Bruno Latour, Michael Callon, and John Law in the late 1970s (O'Connell et al., 2014). It originated from the social study of science and technology (Jones & Dugdale, 2002) primarily to understand the social construction of science (O'Connell et al., 2014). It serves as a material-semiotic method that maps relationships both material (between things) and semiotic (between concepts), emphasizing how everything in the social and natural worlds is interconnected through these networks (O'Connell et al., 2014).

ANT examines how networks have been developed and maintained, focusing on the roles of all actors, both human and non-human, such as technology (O'Connell et al., 2014), providing a vocabulary for building networks that describe the coordination of social and technical actors (Uden & Francis, 2009). It has been particularly influential in accounting research over the past two decades, allowing scholars to explore how accounting practices, such as the rise of activity-based costing, influence and are influenced by local actions and broader networks (O'Connell et al., 2014). Drawing on actor-network theory, ABC is examined as a socio-technical system (Jones & Dugdale, 2002).

This theory facilitates understanding of the dynamic interactions within networks that contribute to the construction and reconstruction of knowledge, thereby producing accepted facts and influencing organizational practices and management accounting changes (O'Connell et al., 2014). The professional literature on management accounting has shown an increasing interest in new methods of costing products and activities (Bhimani & Pigott, 1992). This surge coincides with a significant amount of criticism directed towards traditional volume-based cost models in recent years, particularly with regard to the accuracy of product costing (Kennedy & Graves, 2001; Tran & Tran, 2022; Bhimani & Pigott, 1992; Jones & Dugdale, 2002).

## 4. Methodology

This study adopts a qualitative approach to examine the implementation of ABC in a local firm to investigate factors that influenced ABC implementation. The firm is located in Makkah Al-Mukaromah, Saudi Arabia, and it will be referred to as Con. company to ensure confidentiality. The company was established in 2000 with 1,500,000 Saudi Riyal invested capital and has over 5000 employees operating in four main departments: general construction, electromechanical contracting, operation and maintenance services, and fire extinguishing and alarm works. The company has carried out huge and numerous construction works in many cities across Saudi Arabia. Over the years, the cost system used by this company has gone through several changes since it was first put in place in 2000. Currently, it is structured on an ABC model. The general management adopted ABC in 2023.

A case study helps to conduct a thorough and in-depth examination at the necessary level to gain a better comprehension of the execution of cost systems. (Allain & Laurin, 2018). Therefore, a case study has been conducted to obtain a comprehensive image of the firm's experiment with ABC implementation. Interviews usually have higher response rates and involve verbal exchanges with the participants (Swenson, 1995). During these interviews, the participants also provided explanations for most of their responses, which resulted in a rich data set (Swenson, 1995). Verbal communication also aids the researcher in understanding the participants' accounting systems, plant operations, products, and customers (Swenson, 1995). This type of communication helps avoid potential misunderstandings, as the researcher can respond to any questions the interviewees may have (Swenson, 1995). Therefore, interviews were conducted with a total of 7 individuals during April and July 2024: one Purchase Manager, one Purchase Officer, four Accountants, and a Field Engineer (Table 1). All the interviewees were engaged in the ABC implementation process, so they could provide valuable insight. The researcher has decided to utilize semi-

structured interviews to gather data. This method offers the opportunity to ask additional questions when a response is unclear, lacks depth, or when technical jargon is not fully understood by the respondent (Najera Ruiz & Collazzo, 2021). It also allows the researcher to explore any hidden meanings that may be present within a response (Najera Ruiz & Collazzo, 2021). Follow-up questions were asked. The follow-up questions have provided a more in-depth understanding of the connections between the factors being evaluated (Adams, 2017). Also, initial findings were shared with participants to verify their accuracy and relevance (Miles *et al.*, 2014). Interviews lasted approximately 38 minutes to one hour. During the assessment, interviewees were asked to understand why changes were made to the system and whether it was capable of providing the necessary information (Allain & Laurin, 2018). They were also asked about the system's intended purpose and whether it fulfilled those purposes, as well as the important requirements needed to achieve these objectives (Allain & Laurin, 2018). Following Miles *et al.* (2014) and Adams's (2017) approaches, the author listened to the interview recordings and read the transcripts multiple times to identify themes and issues and organize the data around both the research questions and the themes and issues that emerged during the interviews. Through inductive and deductive coding approaches, three themes were identified: 'Inside Actors,' 'Outside Actors,' and 'Technology' (Adams, 2017). From the broad codes, a set of specific codes emerged entirely from the data (Adams, 2017).

**Table 1: Interviewee Information**

<b>Interviewee Code</b>	<b>Interviewee Position</b>	<b>Date</b>	<b>Length of Interview</b>
FE	Field Engineer	April 8	46 m
PM	Purchase Manager	April 3	1 h12 m
Acc. 1	Accountant	April 4	1 h09 m
Acc. 2	Accountant	April 6	58 m
Acc. 3	Accountant	April 7	55 m
Acc. 4	Accountant	July 24	38 m
PO	Purchase Officer	July 25 – July 26	42 m

## **5. Findings**

The themes and key findings for each specific code arising from the data are summarized in Tables 2

**Table 2: Schema of Themes and Key Findings**

<b>Themes (Deductive)</b>	<b>Specific codes (Inductive)</b>	<b>Summary of key findings</b>
Internal actors	Top Management	Management played a crucial role in providing strategic direction and granting the necessary approvals for financial investments. By offering strategic oversight, championing the project, and allocating resources, they demonstrated their commitment to driving the project forward. This leadership is essential to overcoming resistance and ensuring that the implementation of the ABC project aligns with the broader strategic goals of the company
	Managers	Facilitating communication between departments, managing the transition, and utilizing ABC data for operational improvements. Managers act as intermediaries between top management and frontline employees, ensuring that the implementation is smooth and that the benefits of the ABC system are fully realized in operational practices.
	Employees	Employee buy-in is critical for the success of the new ABC system, as they are directly involved in its daily adoption and adaptation. Engaging with the system on a daily basis, employees enter data and adapt to new workflows, which ensures the quality of the data collected and contributes to the overall effectiveness of the system
Technology	Software	The software is the core of the ABC system, designed to handle specific costing methodologies and complex data inputs. This technology has significantly influenced workflows and information processing patterns within the company, ensuring that the ABC system is tailored to the company's specific needs. With the right software, the system is well-equipped to address industry-specific costing challenges, enhancing efficiency and accuracy in data management.
	Hardware	Having adequate hardware supports the necessary software, manages large volumes of data, and provides the computational power required to maintain high performance. These technological elements integrate to enhance overall productivity and effectiveness in corporate environments

<b>Themes (Deductive)</b>	<b>Specific codes (Inductive)</b>	<b>Summary of key findings</b>
External actors	Yara Soft Company,	Yara Soft, serving as the technology provider, their role extends beyond just providing the software; they are also involved in assisting with system integration and offering post-implementation support. This ongoing support from Yara Soft is vital for addressing the technical aspects of the implementation, ensuring the software continuously meets the specific needs of Con Company, and providing necessary maintenance and updates.
	Consulting Company	Offering a comprehensive suite of services, including implementation, staff training, and support for system customization. providing specialized knowledge that helps avoid common pitfalls and tailor the system to meet specific organizational needs.

Adaptation and strong linkages between human and non-human actors are crucial for successfully implementing ABC projects, especially in complex organizations (Gosselin & Journeault, 2022). According to Gosselin and Journeault (2022), a network of various actors, including the implementation team, managers, consultants, budgeting activities, and accounting and information systems, must interact to facilitate the translation and implementation of new cost management practices. In the case of Con. Company, multiple internal and external actors, along with technology, worked together to form a network that enabled the implementation of ABC. Key actors included top management, managers, employees, technology, Yara Soft, and consultants. Their alignment and cooperation were essential for the successful implementation of ABC, illustrating the interconnectedness of various elements within an organizational network. The analysis revealed that the top management of Con company played a pivotal role in supporting the shift toward ABC implementation from the beginning (PM, Acc.1, Acc.2, Acc.3, FE). Their leadership was instrumental in conducting a thorough and comprehensive analysis of the company's project outcomes in 2022 (PM). The objective of the analysis was to identify the reasons for the shortcomings of their projects (PM). The company undertook an extensive search to determine the root cause of

the problems (PM). After a careful examination, the company concluded that the primary problem was the calculation of the cost of failed projects (PM). The company found that the cost system was not accurately accounting for the expenses of the failed projects, leading to inaccurate reporting and misallocation of resources (PM). As a result of this, Con Company realized the urgent need to revise their costing system and procedures to prevent similar problems in the future and started to study their possible options for a more accurate system (PM), according to FE:

"[...] the chaotic nature of the construction field makes it very hard to determine the cost very precisely [...] our calculations were not 100% accurate; we needed a new system for sure."

Chairman of the Board of Directors of the Saudi Contractors Authority, Zakarya Al-Abdulqader, said that the size of the contracting sector during the years 2023 and 2024 reached about 280 billion riyals annually ("The Head of the Contractors," 2024). Al-Abdulqader expected, in statements during the activities of the International Contracting Conference, that these numbers would multiply, starting in 2025, by about three times to reach one trillion riyals annually ("The Head of the Contractors," 2024). He added that the Kingdom will sign contracts for contracting projects worth 1.8 trillion riyals until 2030, expecting this to be reflected in raising the sector's contribution to the gross domestic product from its current rate of 6% ("The Head of the Contractors," 2024). This projection underscores the intense competition within the sector. According to Tran & Tran (2022), companies in highly competitive environments are more likely to implement the ABC system. Emphasizes the urgent need for Con to improve its performance and maintain its reputation in light of this intense competition.

The senior management was facing a pressing issue that needed to be urgently resolved, and they were determined to find a solution as soon as possible to resolve this issue (PM). This was necessary to obtain a larger number of projects, which would help to compensate for losses and return the company to profitability (PM). The result of management's research to reach



the best solution was applying a new costing system that determines costs more precisely (PM). This was after noticing that the costs that were expected for a number of projects were much lower than the actual costs, which caused huge losses in several projects (PM). PM gave some insights regarding this issue.

"Often, in the field of construction, construction companies apply to a tender and submit a bidding after calculating the expected costs of the project and determining the appropriate profit margin. Accordingly, the construction company must calculate its costs with high accuracy to ensure the profitability of the project, and any error in calculating costs will lead to huge losses."

In order to enhance its financial performance, the company sought help from Yara Soft to adopt a new cost system (PM, Acc.1, Acc.2, Acc.3, Acc.4, PO, FE). With the strong backing of the senior management, the implementation process was initiated at the beginning of 2023 (PM, Acc.1, Acc.2, Acc.3, FE). The accountant and other managers from different departments showed their support (PM, Acc.1, Acc.2, Acc.3). They expressed their exhaustion over the mistakes and the wasted time that was spent redoing their work (Acc.1). The support of the managers and employees of different departments was significant, as they believed that the new system would constitute a qualitative shift for the company as a whole (PM). They were convinced that a system of this complexity and cost is expected to have more accurate outputs, which will make their work easier (PM, Acc.1, Acc.2, Acc.3, FE). As Acc.3 commented:

"Expectations of the new system were positive. It will be a tool for developing the company, especially increasing internal control and the accuracy of information that helps in making decisions, thus reducing costs in the long term."

**PM stated that:**

"[the new system] helps management make quality and timely decisions  
Activity-based costing provides more accurate and detailed information about

costs, enabling management to make strategic decisions and improve operational performance."

On the other hand, Acc.2 believed that engineers were resistant, especially at the beginning of the implementation process. The engineers thought that it was not necessary to change the old system at all (Acc.2). According to Acc. 2, some of those resisting the new system were saying.

"It [the new system] is too complex and hard to understand. The Excel sheet [old system] was just fine."

**Acc. 4 also asserted this fact as Acc. 4 noted that:**

"There was dissatisfaction among the employees [...] They expressed concerns regarding the extended implementation period required for the new program, noting that it could potentially disrupt workflow. Additionally, they found the program challenging to grasp."

This aligned with Gosselin's findings that one of the main difficulties encountered regarding ABC implementation was resistance to change (2007). Resistance to the new system could be attributed to factors reported by Adams and McNicholas in 2007. They indicated that resistance often arises from a lack of time to prepare reports and insufficient resources (Adams & McNicholas, 2007). Implementing a training program could be beneficial in addressing these issues (Shield, 1995). Such a program should cover the logic, design, implementation, and usage of ABC systems (Shield, 1995). This approach not only helps in reducing resistance but also provides non-accountants with the necessary foundation to accept, understand, and effectively use ABC information (Shield, 1995). Also, many researchers have claimed that training is an important factor in implementing ABC successfully (Anderson, 1995; Anderson & Young, 1999; Gosselin, 1997; Gosselin, 2007; Kennedy & Graves, 2001; Major & Hopper, 2005; Malmi, 1997; Quesado & Silva, 2021; Shields, 1995; Swenson, 1995). According to all interviewees, the company trained its employees to ensure adequate knowledge and understanding to use the new system effectively (PM, Acc.1,

Acc.2, Acc.3, Acc.4, PO, FE). Intensive training courses were held for all employees working on the system, as it took a lot of time, and employees exerted huge effort (PM, Acc.1, Acc.2, Acc.3, Acc.4, PO, FE). As PO commented on that

"The most challenging aspect of adopting ABC was managing the extensive workload while attending training sessions and working on the project concurrently".

The training was not limited to understanding how the new system works but also how the new technology should be used (PM). The previous technology used by the company was quite basic and involved an Excel file that was updated sporadically (PM, Acc.1, Acc.2, Acc.3, Acc.4, PO, FE). The old system was primitive for a company of its size (PM), and it resulted in numerous errors (PM, Acc.1, Acc.2, Acc.3, Acc.4). These errors led to a waste of multiple company resources (PM, Acc.1, Acc.2, Acc.3). Many meetings were held between department managers, senior management, and Yara Soft company over a period of several weeks in order to identify the key components for the development of the ABC model, including activities and cost drivers (PM, FE), along with the performance measures to monitor (PM). As PM stated:

"[...] It was challenging to identify the overall activities that influence costs, and it was not easy to select the most suitable cost driver; it would not be efficient if the choices of the cost drivers were not precise [...]"

The adoption process for the new cost system necessitated several modifications to the existing financial system for effective integration (PM, Acc.1, Acc.2, Acc.3, FE). This included a substantial financial investment and required the approval and support of top management (PM). Key changes highlighted by Acc.1 include:

"Establishing new departments to keep up with the system, like the quality and support department, purchasing a high-quality server, creating an internal

network with a high level of protection, and training users on the system [...]."

Enrolling an information system is a multifaceted process that requires careful consideration and planning (PM). Based on the insights from Bloomfield et al. (1992), this process necessitates expanding an actor-network to incorporate essential personnel and technology. The company has engaged in a strategic partnership by signing full-time contracts with Yara Soft to ensure the system's operational integrity and periodic maintenance (Acc. 3, Acc.4). The company also hired technical experts such as computer engineers, electricians, quality specialists, and systems analysts (Acc. 3). In alignment with the system upgrade, there has been a comprehensive renewal of devices (PM, Acc.1, Acc.2, Acc.3, Acc.4, PO, FE). This renewal process is critical to maintain compatibility with the new system and to leverage the latest technological advances (PM).

Alongside significant investment in obtaining sophisticated software and compatible hardware, Con company also invested heavily in consulting services (PM, Acc.1, Acc.2, Acc.3, Acc.4, PO, FE). They recognized that for the implementation to be effective, they would need to obtain consulting services to guide them through the process (PM). They made a substantial investment in acquiring consulting services from a consulting firm that had expertise in operating such systems, especially in the field of construction where ABC systems were not commonly used (PM). The consulting services helped Con Company to successfully implement the ABC system and improve the data or information that they could obtain from it (PM, Acc. 1). Consulting services provided important details and oversight that played a distinctive role in achieving the desired results (PM). This also helped to avoid errors and improve the level of their work (Acc.2). Con Company believed that obtaining external opinions was important to control the company's internal workings directly (PM). Therefore, they actively sought external input from consulting firms (PM). By doing so, they were able to improve the

performance of their business and better control their internal operations (PM, Acc.1).

Acc. 1 reported on the implementation's progress, highlighting the significant costs incurred due to the need for upgraded software and compatible hardware and the costs of consulting services. However, the investment in consulting services paid off, as the ABC system was successfully implemented and improved the business's performance (Acc.1):

"The costs associated with implementing the new ABC system were very high, including software, hardware, and consulting services. However, we deemed these costs necessary to ensure an effective and successful implementation of the system. I believe that these costs have paid off in the end."

The successful implementation of Con Company's ABC system exemplifies the application of Actor-Network Theory, highlighting the interplay among various human and non-human actors. This network includes top management, department managers, employees, technological systems, the consulting firm, and Yara Soft, each playing a crucial role in the system's integration and operation.

Management spearheaded the initiative, providing strategic direction and necessary approvals for financial investments. Their leadership was vital in advocating for the change and securing the required resources. Department managers and employees, as operational actors, were directly involved in the day-to-day adoption and adaptation of the new system. Their acceptance and practical engagement were crucial for the ABC system to effectively reflect the actual costs and activities within the company. The technology, including new software and hardware, acted as a non-human actor within ANT. It required configuration and integration into existing systems, which computer engineers and IT specialists facilitated. The role of technology went beyond mere tools, influencing workflows and information processing patterns within Con Company. The consulting firm and Yara Soft were external but integral actors in this network. The consulting firm brought expertise in ABC

systems, particularly in the construction industry, guiding Con Company through the nuances of implementation and helping to tailor the system to their needs. Yara Soft's role was critical in providing the software solution and necessary support, ensuring the system was robust and capable of handling the company's complex costing needs, thereby instilling confidence in the system's success.

The diverse actor network's collaborative effort was instrumental in the ABC system's successful implementation. The interactions between these actors, negotiating, adapting, and aligning their efforts toward a common goal, underscored the system's success. This collaborative effort allowed Con Company to overcome resistance, manage the complexity of the new system, and achieve a more accurate and transparent costing process. The ANT perspective highlights that the success of such a system is not merely about the technology but about the dynamic and continuous relationships among all actors involved, emphasizing the importance of ongoing collaboration.

## **6. Conclusion**

This study's findings align with numerous researchers who have emphasized that the successful execution of ABC heavily relies on the support of top management (Allain & Laurin, 2018; Anderson, 1995; Anderson & Young, 1999; Briers & Chua, 2001; Gosselin, 1997, 2007; Gosselin & Journeault, 2022; Major & Hopper, 2005; Malmi, 1997; Quesado & Silva, 2021; Shields, 1995; Swenson, 1995). However, successful ABC implementation is not solely dependent on support from business leaders but also requires the cooperation of various departments and employees, as noted by Tran & Tran (2022). This was evident at Con. company, where all departments collaborated effectively with Yara Soft to ensure a seamless transition and optimize the implementation process.

This study demonstrates the factors that influence the adoption and implementation of ABC in an industry that does not commonly apply it to have an adequate system that would offer outcomes that aid the company in planning, controlling, and decision-making processes. The interview findings

show that many human and non-human actors impacted this change. As actor-network theory suggests, adopting an innovation involves adapting it, achieved through a collective construction effort of both human and non-human actors (Alcouffe et al., 2008). The effective utilization of Con. Company's ABC system serves as a prime example of applying the ANT, highlighting the interaction among different human and non-human elements. This network comprises senior management, department heads, staff, technological infrastructure, the consulting company, and Yara Soft, each fulfilling a vital role in integrating and operating the system. Through collaborative teamwork and dynamic connections, the diverse actor network significantly contributed to the successful implementation of the ABC system, enabling Con. company to overcome opposition, handle complexity, and establish a more precise and transparent cost estimation process. This research provides valuable insights into adopting sophisticated costing methods in the construction industry, highlighting that successful implementation depends on a well-coordinated network of actors capable of dynamically interacting and adapting to the evolving organizational and technological landscape.

Although some tentative conclusions can be highlighted from the presented case study, the small sample size typical of such research must be considered. The study faced time and interview-related limitations, and with more time and a larger sample size, a broader range of perspectives and experiences could have been captured, adding depth to the findings. Additionally, incorporating secondary documents like internal reports could have enriched the research, offering a more layered understanding of the company's practices and the broader aspects of ABC implementation. To address these limitations, a longitudinal study following the company over several years is recommended, as it would provide insights into the long-term impacts of ABC implementation, changes in cost management effectiveness, and strategic decision-making while uncovering the evolving nature of challenges and benefits associated with ABC over time.

## Reference

- Chairman of the Contractors Authority Expects the Sector to Triple in Size by 2025 Reaching one Trillion Riyals. (2024, February 28). Argaam Financial Portal. Retrieved April 18, 2024, from <https://www.argaam.com/ar/article/articledetail/id/1708631>
- Adams, C., 2017. Conceptualising the Contemporary Corporate Value Creation Processes. *Accounting, Auditing and Accountability Journal*, 30(4), pp.906-931.
- Adams, C. A., & McNicholas, P. (2007). Making a Difference: Sustainability Reporting, accountability and organisational change. *Accounting, Auditing & Accountability journal*, 20(3), 382-402.
- Alcouffe, S., Berland, N., & Levant, Y. (2008). Actor-Networks and the Diffusion of Management Accounting Innovations: A Comparative Study. *Management Accounting Research*, 19 (1), 1-17.
- Allain, E. and Laurin, C., 2018. Explaining Implementation Difficulties Associated with Activity Based Costing Through System Uses. *Journal of Applied Accounting Research*, 19(1), pp.181-198.
- Anderson, S. W. (1995). A framework for assessing cost management system changes: the case of activity based costing implementation at General Motors, 1986-1993.
- Anderson, S. W., & Young, S. M. (1999). The impact of contextual and process factors on the evaluation of activity-based costing systems. *Accounting, organizations and society*, 24(7), 525-559.
- Baykasoğlu, A., & Kaplanoğlu, V. (2008). Application of activity-based costing to a land transportation company: A case study. *International Journal of Production Economics*, 116(2), 308-324.



- Bhimani, A., & Pigott, D. (1992). Implementing ABC: A case study of organizational and behavioural consequences. *Management Accounting Research*, 3(2), 119-132.
- Bloomfield, B.P., Coombs, R., Cooper, D.J. and Rea, D., 1992. Machines and manoeuvres: responsibility accounting and the construction of hospital information systems. *Accounting, Management and Information Technologies*, 2(4), pp.197-219.
- Cooper, R., & Kaplan, R. S. (1988). Measure costs right: make the right decisions. *Harvard business review*, 66(5), 96-103.
- Enes, K., & Koşan, L. (2024). Using time-driven activity-based costing in restaurant business: Levelled application of a case study. *Heliyon*, 10(4).
- Gosselin, M. (2007), "A review of activity-based costing: technique, implementation, and consequences", in Chapman, C.S, Hopwood, A.G. and Shields M.D. (Eds), *Handbook of Management Accounting Research*, Elsevier, Oxford, pp. 641-672.
- Gosselin, M. (1997). The effect of strategy and organizational structure on the adoption and implementation of activity-based costing. *Accounting, Organizations and Society*, 22, 105-122.
- Gosselin, M., & Journeault, M. (2022). The implementation of activity-based costing by a local government: an actor-network theory and trial of strength perspective. *Qualitative Research in Accounting & Management*, 19(1), 18-44.
- Hoozee, S. and Hansen, S.C., 2018. A comparison of activity-based costing and time-driven activity-based costing. *Journal of Management Accounting Research*, 30(1), pp.143-167.

- Jones, T. C., & Dugdale, D. (2002). The ABC bandwagon and the juggernaut of modernity. *Accounting, organizations and society*, 27(1-2), 121-163.
- Kaplan, R.S., 1984. The evolution of management accounting. *Readings in accounting for management control*, pp.586-621.
- Kaplan, R.S., 1994. Management accounting (1984-1994): development of new practice and theory. *Management Accounting Research*, 5(3-4), pp.247-260.
- Kennedy, T. and Affleck-Graves, J., 2001. The impact of activity-based costing techniques on firm performance. *Journal of Management Accounting Research*, 13(1), pp.19-45.
- Major, M., & Hopper, T. (2005). Managers divided: Implementing ABC in a Portuguese telecommunications company. *Management Accounting Research*, 16(2), 205-229.
- Malmi, T. (1997). Towards explaining activity-based costing failure: accounting and control in a decentralized organization. *Management accounting research*, 8(4), 459-480.
- Miles, M.B., Huberman, A.M. and Saldaña, J. (2014) Qualitative data analysis. California: Sage Publications Inc.
- Najera Ruiz, T. and Collazzo, P., 2021. Management accounting use in micro and small enterprises. *Qualitative Research in Accounting & Management*, 18(1), pp.84-101.
- O'Connell, B., Ciccotosto, S., & De Lange, P. (2014). Understanding the application of Actor-Network Theory in the process of accounting change.
- Quesado, P., & Silva, R. (2021). Activity-based costing (ABC) and its implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 41.

- Sánchez-Rebull, M. V., Niñerola, A., & Hernández-Lara, A. B. (2023). After 30 Years, What Has Happened to Activity-Based Costing? A Systematic Literature Review. *SAGE Open*, 13(2), 21582440231178785.
- Swenson, D. (1995). The benefits of activity-based cost management to the manufacturing industry. *Journal of Management Accounting Research*, 7.
- Tran, U. T., & Tran, H. T. (2022). Factors of application of activity-based costing method: Evidence from a transitional country. *Asia Pacific Management Review*, 27(4), 303-311.
- Uden, L., & Francis, J. (2009). Actor-network theory for service innovation. *International Journal of Actor-Network Theory and Technological Innovation (IJANTTI)*, 1(1), 23-44.
- (Uden & Francis, 2009).
- Velmurugan, M. S. (2010). The Success and Failure of Activity-Based Costing Systems. *Journal of Performance Management*, 23(2).