

Factors affecting the adoption of activity-based costing in a South African state university



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Orientation: There is a lack of empirical studies regarding the adoption and implementation of the activity-based costing (ABC) system in South African state universities, despite its advantages.

Research purpose: This study reports the perceptions on the factors influencing the adoption of ABC held by finance and academic staff at the Durban University of Technology (DUT), KwaZulu-Natal.

Motivation for the study: The lack of empirical studies demanded understanding of those factors that influence the adoption of ABC at state-owned universities in South Africa. Therefore, this study examined the factors influencing the adoption of ABC in a South African state university using the DUT as a case study.

Research approach/design and method: The study adopted a mixed research method conducted with 202 staff members: 129 academics, 41 heads of departments and 32 finance staff.

Main findings: The positive factors influencing the adoption of ABC included the organisational strategy, information technology, decision usefulness of cost information, contextual or environmental factors and the organisational structure. However, the systems adaptability theme was considered a barrier to the adoption of ABC.

Practical/managerial implications: The information could inform strategic initiatives related to the adoption and implementation of ABC in the university or similar state-funded universities.

Contribution/value-add: The study provided an empirical understanding of the factors that would hinder and assist the adoption and execution of the ABC system.

Keywords: activity-based costing; implementation barriers; implementation facilitators; public universities; overhead costing system.

Introduction

Budgetary constraints associated with freezing of fees, government-regulated tuition increases and limited government funding (Aislinn 2015; Su et al. 2021) have increased the pressure to reform cost management strategies in state-funded South African universities (Naidoo 2011). The increased competition for limited government funding now means that proper management of escalating costs as well as being cost efficient is imperative in state universities in South Africa. A number of universities are still using traditional costing systems that usually depend on a single, volume-based cost driver, usually student numbers (Langfield-Smith et al. 2018), the number of direct labour hours worked or the direct labour cost (Langfield-Smith et al. 2018). Support costs, such as information technology (IT), financial aid, library, security, admissions, examinations and student services, that were previously considered as fixed and irrelevant in decision-making have become increasingly important areas of resource consumption. Traditional costing systems often distort costs and do not reflect the increasing complexities, advanced technology and multiplicity of programmes and services that are now offered by universities (Sanches, Souto & Gago-Rodríguez 2022). These changes demand more accurate cost allocation techniques. An enhanced costing system, such as activity-based costing (ABC), could be a solution towards effective cost management (Naidoo 2011). Al-Halabi and Shaqqour (2018) defined ABC as an approach to internal cost accounting that involves analysing, recording, controlling and reporting on the costs and wider performance of activities, rather than the traditional narrow emphasis on the costs of departments and cost centres. Existing systems may assume that two university programmes have the same overhead cost because they consume the same direct

labour (a blanket volume-based overhead rate), thereby overstating the cost of simple programmes offered to many students and understating the cost of complex programmes offered to fewer students. Where costs are considered, it is often only the incremental or short-term costs, with little significance given to long-term indirect costs which may be considerable expenditures (Pashkevich, Von Schéele & Haftor 2023). In short, there is no proper tool that effectively measures the accuracy of the overhead or indirect costs consumed by cost objects (specific programmes). The rationale for using ABC is to accurately determine a functional relationship between indirect costs and products or services based on the previously unmeasured factors that most influence them (Akgün et al. 2023). The core idea is that 'cost objects consume activities and activities consume resources' (Su et al. 2021). Activity-based costing assigns resources to the activities that consume them and then to the cost object (individual programme) based on the activities that the cost object (individual programme) consumes (Langfield-Smith et al. 2018). Activity-based costing provides information about the root cause of activities, measuring the cost of the activities and then assigning the activity costs to an individual cost object or service (programme) to better meet the needs of customers (Hoang, Pham & Nguyen 2020). In essence, ABC focuses attention on the costs of various activities required to produce a product or service and assigns these indirect costs to cost objects, such as products or services, based on activities performed for the cost objects (Baird, Harrison & Reeve 2004).

Despite these positives, ABC has not yet been widely implemented or adopted in universities (Naidoo 2011). Most studies have focused on ABC implementation in general (Hashim 2015) with some studies focusing on specific sectors, such as life insurance companies (Adams 1996), health institutions (Goldberg & Kosinski 2011), transport companies (Baykasoglu & Kaplanoglu 2008), financial institutions (Baird et al. 2004), hotels (James 2013), with most studies highlighting successful application under constrained budgetary conditions. There have only been a few studies on ABC implementation in public or state-funded universities (Hashim 2015). In the South African context, studies have focused on Technical and Vocational Education and Training (TVET) colleges (Madwe 2017) and private universities (Naidoo 2011). Literature shows that there has not been an investigation on the factors affecting the adoption and implementation of ABC in South African state universities.

The factors used in this study have been empirically identified as the key factors in the adoption and implementation of ABC in other studies. This study aimed to find out factors influencing the adoption and implementation of ABC at Durban University of Technology (DUT) using mostly factors found to be associated with ABC success (Garrison, Noreen & Brewer 2015:278) in prior studies, namely, strategy (Anderson 1995; Gosselin 1997; Michela & Irvine 2005), decision usefulness of cost information (Anderson & Young 1999; Baird et al. 2004; Krumwiede 1998), environmental or contextual factors (Anderson 1995; Cagwin & Bouwman 2002; Anderson, Hesford & Young 2002; Krumwiede 1998;

Malmi 1997), behavioural and organisational factors (Foster & Swenson 1997; McGowan & Klammer 1997; Shields 1995; Shields & McEwen 1996), organisational structure (Gosselin 1997), technical factors (Anderson & Young 1999; Fei & Isa 2010; Innes & Mitchell 1998), IT (Cagwin & Bouwman 2002; Krumwiede 1998) and system adaptability (Argyris & Kaplan 1994; Drake, Haka & Ravenscroft 1999; James 2013). This study investigates how these factors influence the adoption and implementation stages of the ABC at DUT.

Therefore, this study investigated the factors that influence the adoption and implementation of ABC as a cost management strategy in a state university in South Africa, using the DUT as a case study. The theoretical framework on which this study is grounded is the contingency theory that is widely used to explain the characteristics of management accounting systems (MAS) as financial or strategy tools in organisations (Su et al. 2021). It has been widely adopted in research studies in the management accounting field (Fei & Isa 2010; Sartorius, Eitzen & Kamala 2007).

Literature review

While ABC has been shown to be an effective tool for cost management in higher education institutions, there are several factors that may affect its successful adoption and implementation. Previous studies have highlighted the importance of leadership support, employee involvement, adequate training and effective communication in the success of ABC adoption and implementation (Krumwiede 1998; Madwe 2017; Su et al. 2021). Moreover, the complexity of the ABC system may pose a challenge for its successful implementation. Akgün et al. (2023) noted that the design and implementation of an ABC system can be time-consuming and expensive. Additionally, the accuracy of the ABC system depends on the accuracy of the cost data and the allocation of costs to specific activities. This requires a thorough understanding of the institution's activities and processes, which can be difficult to achieve in practice (Langfield-Smith et al. 2018). Despite these challenges, the benefits of ABC adoption and implementation in higher education institutions are significant. Activity-based costing can assist universities in making informed decisions about resource allocation and in developing more accurate pricing structures for courses and degrees. It can also enable management and staff to better understand their actions and decisions by focusing on the activities consuming resources. Additionally, ABC can provide a benchmark of indirect costs and increase the accuracy in calculating indirect expenditures.

There have been numerous studies conducted on the adoption and implementation of ABC in universities, with researchers highlighting the benefits of ABC for cost control and containment. For instance, Akgün et al. (2023) found that ABC provides accurate cost information and computation, which are essential for cost control in universities. Similarly, Pashkevich et al. (2023) identified ABC as a useful tool for understanding cost behaviour in university libraries and refining cost systems. Other studies have also demonstrated

the effectiveness of ABC in various university departments. For instance, Heskin and Sharma (2001) found that ABC is beneficial in the social and behavioural sciences department, while Reich and Abraham (2006) demonstrated that revolving door workshops are effective in collecting staff activity data for setting up university cost drivers. Furthermore, Akgün et al. (2023) emphasised the importance of organisational factors such as top management support, internal champion support, and staff support for successful ABC implementation in Australian universities. In a more recent study, Su et al. (2021) analysed the adaptability and application value of ABC in colleges and universities, concluding that the indirect cost allocation process using ABC leads to more accurate cost accounting results that benefit educational costs.

Factors that affect the adoption and implementation of activity-based costing

Strategy

Studies have identified strategy as a factor positively influencing the adoption and implementation of ABC (Madwe 2017; Michela & Irvine 2005). Madwe (2017) found that companies following a prospector strategy are more likely to adopt ABC than those following a defender, analyser, or reaction strategy. This is because companies following a prospector strategy are more innovative in nature and are willing to adopt new management techniques (Pashkevich et al. 2023).

Decision usefulness of cost information

The usefulness of cost information in a system depends on its relevance to managers and compatibility with the firm's strategy (Al-Halabi & Shaqqour 2018). In industries where prices are market-driven, there may be no need for a highly reliable product cost system. However, in industries where prices are highly competitive, and a company sells multiple products, ABC can be a useful tool in decision-making. Studies have shown a positive relationship between successful ABC implementation and decision usefulness of cost information (Baird et al. 2004) in setting up a MAS. Fei and Isa (2010) suggested that ABC can provide partial solutions in product costing, customer costing, channel profitability, process improvements, and product mix and volume decisions. Therefore, firms can use the information generated through ABC in negotiations with suppliers for cost-reduction efforts (Kitsantas, Vazakidis & Stefanou 2022).

Environmental or contextual factors

Studies (Sanches et al. 2022) have suggested that the failure of ABC implementation is often because of contextual factors such as organisational values, culture and climate, rather than the process of implementation itself. Activity-based costing aims to reduce distortions caused by arbitrary allocation of indirect costs in traditional systems. Firms with a higher potential for cost distortions are more likely to adopt

ABC, according to a survey conducted by the Institute of Management Accountants (IMA) (Krumwiede 1998; Madwe et al. 2020). Furthermore, larger companies tend to have more resources, both in terms of personnel, computing facilities, and time, which are required for both management and the development of a complex cost system such as ABC (Elagili 2015). Thus, organisational factors, along with size and complexity, play a crucial role in the successful adoption and implementation of ABC.

Behavioural and organisational factors

The success or failure of ABC is heavily influenced by various behavioural and organisational factors. These factors have different degrees of importance at different stages of ABC implementation. According to Madwe et al. (2020), there are seven important behavioural and organisational variables that are crucial in the implementation of ABC. These are top management support, competitive strategies, particularly quality and speed strategies, performance evaluation and compensation, sufficient internal resources, training in designing, implementing and using the system, non-accounting ownership, and consensus about and clarity of the objectives of the cost management systems.

Organisational structure

According to a case study conducted by Kitsantas et al. (2022), the resistance to ABC may be fundamentally linked to the organisational structure, which cannot be eliminated by implementation-based strategies like participant involvement. Studies have shown that the traditional organisational structure hinders effective communication on ABC between departments and other areas of the organisation. For instance, Madwe et al. (2020) and Naidoo (2011) suggested that conventional hierarchical structures make it difficult for employees to understand the importance of ABC and its implications for their work.

Information technology

Prior literature on the impact of IT on ABC implementation is conflicting (Krumwiede 1998; Nair & Tan 2018). For some organisations adopting ABC, high-quality information systems are considered a key factor in reaching the highest implementation stage where ABC is used extensively and integrated with the primary financial system. In addition, management with higher quality IT may feel better able to implement ABC than companies with less sophisticated IT systems because the costs of measurement are lower (Nair & Tan 2018). Hence, organisations that have a high level of IT are regarded as being more likely to successfully adopt ABC. Thus, firms that abandon ABC after implementing it also tend to have relatively strong existing information systems (Krumwiede 1998; Su et al. 2021). Therefore, higher levels of IT quality may either encourage or discourage the adoption and implementation of ABC. This is supported by previous studies that suggest that organisations with high levels of IT and cost management system are usually reluctant to adopt

and implement ABC. Nair and Tan (2018) agreed that whether the ABC system is integrated with other accounting systems or stands alone, compatibility with an existing IT system is an essential factor in the successful implementation of ABC.

System adaptability

Wahab, Mohamad and Said (2018) suggested that the process of implementing an initiative may not be successful as a result of the barriers created by organisational defensive routines, which are threats to the acceptance of new ideas. The implications of organisational change, such as introducing ABC, should be considered within organisational and cultural contexts in which the change takes place because the human factor is important in any change of conditions (Kitsantas et al. 2022). From an organisational perspective, employee resistance can be a significant deterrent to organisational change (Bvumbi 2017). Major operational adjustments or innovations, such as the implementation of ABC, may find resistance when those changes are perceived by the employees to alter values and visions related to the existing order (Kitsantas et al. 2022). Employee opposition to ABC adoption may disrupt and delay the change process, even causing failure (Nair & Tan 2018). Askarany and Smith (2008) claimed that organisations that adopt innovative policies are more likely to use ABC as such practices provide more appropriate and detailed information than that provided by the traditional costing methods.

Ernst and Young reported on the trial introduction of ABC into three universities in Australia, namely, RMIT University, Murdoch University and Charles Sturt University (Reich & Abraham 2006). Studies in the UK have shown that ABC in the higher education sector has been adopted since the mid-1980s by universities, with the assumption that the more accurate identification of costs makes them more manageable. It was also argued that the environment with which universities are faced, places added impetus to the question of appropriateness (Al-Halabi & Shaqqour 2018). Two studies have been carried out on ABC in the Higher Education sector in SA. One study investigated the implementation of ABC in TVET colleges (Madwe 2017). The study developed a conceptual framework for the adoption of the ABC system in TVET colleges and examined three factors, namely, organisational, behavioural and technical factors. Naidoo (2011) investigated and established that the traditional overhead costing system was still being used in private universities in SA.

There has been no empirical investigation indicating the impact of strategy, technical, organisational structure, environmental or contextual factors, decision usefulness of cost information, behavioural and organisational factors on the successful implementation of ABC in a South African state university. This study seeks to determine the perceived benefits and barriers of ABC and the reasons why the ABC system has not yet been readily adopted and implemented in state universities in South Africa. It will explore how these

factors identified in literature influence the adoption and implementation of ABC systems in a South African state university, namely, DUT.

Research design

This case study on a South African state university, namely, DUT, provides an opportunity to identify the factors that influence the adoption and implementation of ABC that were identified in literature and grouped under the following themes, that is strategy, organisational structure, environmental or contextual factors, behavioural and organisational factors, IT, decision usefulness of cost information, technical and internal systems or systems adaptability (as identified in the contingency theory) which affect the adoption and implementation of ABC.

Contingency theory proposes that the effectiveness of MAS in financial strategy depends on the organisational environment in which it operates (Macy & Arunachalam 1995). The organisational situation and challenges faced by the company are contingencies that may affect the adoption and implementation of MAS. Therefore, the success of a MAS relies on its compatibility with the organisation's environment. Drury (2011) suggested that the effectiveness of a MAS depends on its ability to meet the requirements of various contingencies. This study employs Macy and Arunachalam's (1995) contingency model to examine the factors that may influence the adoption and implementation of the ABC system at DUT.

According to contingency theory, a MAS, such as ABC, supports managerial planning, evaluation, control, and financial strategy (Macy & Arunachalam 1995). However, the effectiveness of such a system depends on several factors. Organisations need to align their systems and processes with their environment and strategy, as external and internal factors affect organisations differently. The fit between the type of technology, environmental volatility, organisation size, features of the organisational structure, and information system affects the effectiveness of the accounting system. Abusalama (2008) argued that the adoption and success of ABC depend on specific contingencies such as product diversity, cost structure, firm size, competition, and business culture.

This study was conducted within the pragmatism research paradigm. Hence, a pragmatic approach was adopted that combines both the deductive and inductive approaches (Creswell 2014; Swain 2017:205). To fully analyse a unique phenomenon, it is necessary to combine the inductive approach with deductive thinking to solve real-world problems. Pragmatism allows for the integration of positivist and interpretivist positions within a single research project, depending on the research question (Creswell 2014). Pragmatic research recognises that there are different ways of interpreting the world and conducting research. The pragmatic approach permits mixed methods of data collection, which offers opportunities for both objective and subjective analysis of participant views (Coe et al. 2017).

The use of a case study design allows for the generation of rich data while reducing subjectivity and increasing construct validity by utilising multiple methods and sources of data (Coe et al. 2017). A bounded case study, which is defined in terms of time, space, and activity, enables a more detailed investigation into the relationship between the phenomena, context, and potential users of the ABC system (Best 2012).

In this study, a concurrent, mixed methods approach was used, specifically an embedded or nested mixed methods design (Swain 2017). The concurrent mixed method data collection strategy was used to validate one form of data with the other (Creswell & Plano Clark 2011).

A survey research strategy was used. The study adopted an exploratory and explanatory case study to identify the relationship between contingent factors and ABC adoption and implementation (explanatory) and there is very little literature on reasons behind the non-adoption and implementation of ABC in state-funded universities in SA (exploratory).

Target population

Although the entire population of DUT could have been used, the study focused on respondents with some knowledge of ABC and, therefore, the target population comprised all academic and administrative staff members at DUT with some knowledge of ABC. The target population of heads of departments (HODs) and staff from finance played a pivotal role in assisting the researcher to understand the structure of the costing system at DUT. The academic staff as well as finance staff enabled the researcher to get the theoretical and practical perceptions on the benefits and shortcomings of ABC as a cost management system. The target population for academics was those academics in the Faculties of Management Sciences and Accounting and Informatics.

In this study, interviews were conducted with academic staff members from the Faculty of Accounting and Informatics, including the HOD and one staff member from the Cost and Management Department who possess significant knowledge about management accounting control systems. The staff members were interviewed to gain insight into the theoretical and practical usefulness of the current MAS in decision-making, planning, and cost control in various departments at DUT. These staff members participate in departmental budgets and contribute to faculty strategic as well as financial meetings, and possess knowledge about the cost drivers that affect related cost centres.

Data collection

Qualitative and quantitative research methods were used to help gain an in-depth understanding of the factors that influence the adoption and implementation of ABC in a South African state university, using DUT as a case study. The sample population was stratified into three groups: finance department, HODs, and academic staff from the

Faculties of Accounting and Informatics as well as Management Sciences. Therefore, the study sample used in this study can be summarised as follows:

- The finance department, comprising a team of cost accountants, cost accounting officers and faculty officers for Support departments, Applied Science, Health, Arts, Accounting and Management Science as well as the library. These administer and handle cost information and services to the university.
- The HODs (52) in all departments at DUT who handle budgets for the different departments at DUT.
- The academic staff from the Faculties of Management Sciences, as well as Accounting and Informatics, have a relevant background and knowledge on cost and management accounting or control systems in the university.

During the first phase of the study, a questionnaire was administered to a total of 217 members of staff, including 33 members of staff in finance and the library, 52 HODs involved in the budgeting process, and 132 academic staff from the Faculties of Accounting and Informatics and Management Sciences. The purpose of this phase was to gather the views and experiences of the participants on factors that facilitate or constitute barriers to ABC adoption and implementation. In the second phase of the study, in-depth interviews were conducted with a self-selecting sample of 12 staff members to delve deeper into issues related to ABC adoption and implementation and to confirm or refute the findings of the quantitative method. The sample size for this phase was restricted to a smaller number of people to reduce the volume of data collected, as recommended by Cherry (2000). The interviews were conducted with six members of the finance department, one HOD, four library staff members, and one member of the academic staff.

In this study, predominantly Likert-scale closed-ended questions were used in the questionnaires, along with a few open-ended questions. To improve the response rate, the researcher distributed and collected the questionnaires in person. Structured and semi-structured face-to-face interviews were also conducted with a self-selecting sample, following a prepared interview guide. The study aimed to collect rich and detailed data from 12 respondents, which would help to mitigate some of the bias and validity threats inherent in qualitative research. Guest, Bunce and Johnson (2006) suggested that in homogeneous studies using purposeful sampling, 12 interviews should be sufficient to achieve data saturation, which is the point at which the study reaches a stage where new information is no longer being gathered. The sample size was carefully chosen to ensure data saturation without missing out on new insights by adding more participants.

Interviews were held with respondents from the finance department as it is the department with the most information on the institution's cost system and would be most affected if ABC is adopted. In addition, the qualitative aspect of the study included interviews with one HOD, four library staff

TABLE 1: Population – Interviews.

Population categories	Number
Finance department	6
Head of department	1
Academic staff	1
Library staff	4
Total	12

members, and one member of the academic staff, in addition to the six members of the finance department. The distribution of interviewees is summarised in Table 1.

To supplement the data collected from the interviews, a survey was also administered to a purposively selected sample of 50 academic staff members in the Faculty of Accounting and Informatics. The survey aimed to elicit information on their perceptions of the usefulness of the current MAS in decision-making, planning and cost control in their departments. The Likert-scale questions in the survey were developed based on the literature review and the interview guide used for the face-to-face interviews. The survey was distributed electronically to the participants via email, and a follow-up email was sent to remind them to complete the survey. The response rate was 62%, with a total of 31 completed surveys. The data obtained from the survey was analysed using descriptive statistics and presented using tables and graphs.

Data analysis

The analysis of the quantitative data was conducted using the SPSS (version 25®) for Windows. Although the sample respondents returned 217 questionnaires, 8 questionnaires were discarded as they were incomplete. Therefore, the final questionnaire returned equated to $n = 202$, comprising 129 questionnaires from the academic staff, 41 HODs and 32 questionnaires from the finance staff. A high response rate of 93% was achieved. The qualitative data were analysed using Nvivo 10 (QSR International Pty Ltd 2014). Nvivo 10 was used to further organise, code and manage non-numerical and unstructured qualitative data.

Limitations

The limitations of this study include the focus on only one university, which restricts the generalisation of the findings to other higher education institutions in South Africa. Additionally, the lack of literature on ABC usage within public state universities in South Africa and the limited number of qualitative interviews conducted could have impacted the depth and breadth of the findings. Another limitation of this study is the reliance on self-reported data, which may have introduced bias into the responses. Finally, the study's focus on the education sector means that the findings may not be directly transferable to other industries or organisations. However, the study's results can still provide insights into the implementation and use of ABC systems in cost information management.

Ethical considerations

This article adhered to all ethical standards to hold the integrity of the research. Ethical approval was obtained from Durban University of Technology's Institutional Research Ethics Committee (Ethical clearance number: REC 20/17) on 14 November 2017, which remains valid as of 2023.

Results

Perceptions of academic and finance staff on 'strategy' as a benefit or barrier to activity-based costing adoption and implementation at Durban University of Technology

This section discussed the perceptions of academic and finance staff on organisational strategy as a benefit or barrier to ABC adoption and implementation at DUT. The results of the survey suggest that there is some disagreement among academic staff about whether the current university strategy supports innovation, with only 48% agreeing with this statement. Furthermore, a majority of respondents (69%) disagreed that ABC would be aligned with the university's competitive strategies and continuous improvement programmes. However, the finance staff showed a higher level of agreement (90.9%) that the organisational strategy fully supports the need for innovation in the form of ABC. This finding is supported by one of the interview respondents (A3). It is important to note that these results represent the perceptions of a purposively selected sample and may not be representative of the entire population. Nonetheless, they provide valuable insights into the perceptions of key stakeholders regarding the potential adoption of ABC at the university:

'The Durban University of Technology has a prospector strategy and is generally open to innovation.' (male, aged 55–65, HOD)

A business culture that includes innovation, outcome orientation and tight versus loose control has a positive relationship with the level of ABC adoption (Baird et al. 2004). Madwe (2017) also found that organisations that adopted a prospector strategy would be more likely to adopt ABC.

Contrary to the perceptions of academic staff, finance staff agreed (agree = 72.7%; strongly agree = 18.2%) with the statement 'ABC would be aligned with the competitive strategies and continuous improvement programs within the university'. It has also been previously reported that positive synergies can be obtained from the concurrent use of other competitive as well as strategic business initiatives and ABC (Krumwiede 1998). Therefore, the finance staff is aware of these efforts as well as the goal of management to improve the activities of the business process.

Comparison of academic and finance staff

Table 2 shows that the scoring patterns of the staff from the finance department and academic staff, using the Fisher's exact test, were statistically significantly different ($p < 0.01$) concerning their perceptions on strategy as a

TABLE 2: Independent *t*-test on the barriers and/or benefits of strategy.

Designation	<i>N</i>	Mean	Std. deviation	Std. error mean	<i>p</i>
Academic staff in the Faculty of Accounting and Informatics and Management Sciences	129	2.9031	1.14748	0.10103	0.000**
Staff from the finance department	22	4.1591	0.49729	0.10602	-

Std., standard.

**, Level of significance $p < 0.01$ (2-tailed).

barrier or benefit to the adoption and implementation of ABC at DUT. Finance staff viewed strategy positively while academic staff viewed it as a barrier to the adoption and implementation of ABC.

Perceptions of academic and finance staff on 'information technology' as a benefit or barrier to activity-based costing adoption and implementation at Durban University of Technology

This section discusses the perceptions of academic and finance staff on IT as a benefit or barrier to ABC adoption and implementation at DUT. According to Kaplan and Anderson (2007), ABC systems can successfully be implemented when the current accounting system supports the collection of ABC information. The findings show that academic staff had divergent opinions on the influence of IT on the adoption and implementation of ABC. The results also show that academic staff at DUT were split in the middle with 48.1% in disagreement (strongly disagree = 7.8%; disagree = 40.3%) and 44.9% in agreement (agree = 39.5%; strongly agree = 5.4%) with the statement that 'there is a high level of architectural and IT software design in the university to support an ABC system'. The architectural and software design of ABC systems involves the extent to which customised ABC software is used.

The interview with respondent A2 suggests that the university has a strong IT infrastructure in place to support the adoption and implementation of ABC. This is consistent with Horngren et al. (2014), who noted that integrated information systems can reduce the costs of developing and operating ABC systems. However, Sartorius et al. (2007) found that the use of commercial software versus custom software was not important to the success of ABC, and Shields and McEwen (1996) argued that the choice of software was relatively unimportant to non-accountants or for the ultimate success of an ABC project. Horngren et al. (2014) also noted that users' perceptions of ABC were not linked to technical characteristics such as custom software or external consultancy. Overall, while technical factors such as IT infrastructure are important in supporting ABC, they may not be the sole determinant of the success of the system. Other factors such as user perceptions, training, and management support may also play a role.

The results reveal that the majority (63.6%) of the academic staff perceive (agree = 38.8%, strongly agree = 24.8%) that the university already has a number of high-level IT and cost management system initiatives that are running smoothly

within the university. This could also be another reason why more staff are unwilling to change the current overhead costing system. This finding is similar to the findings in some previous studies (Anderson 1995). These studies showed that firms that have relatively strong existing information systems and are generally satisfied with the information provided by the existing system may be reluctant to invest the necessary resources in ABC. Such firms with high-level information systems tend to abandon ABC easily after implementing it (Krumwiede 1998). On the contrary, the availability of high-level information is an important factor at the implementation stage as the information system provides detailed historical data and easy access to users that may provide much of the driver information needed by ABC (Gurses 1999).

The study shows that when finance staff were asked to indicate their level of agreement or disagreement with the statement 'There is a high level of architectural and IT software design in the university to support an ABC system', 59.1% (strongly agree = 18.2%; agree = 40.9) of the finance staff were in agreement and 27.3% were unsure on the level of architectural and information software design. However, more than half (77.2%) of the finance staff were in agreement (strongly agree = 22.7%; agree = 54.5%) with the statement that 'there are already a number of high-level IT and cost management system initiatives running smoothly within the university'. This finding shows that finance staff perceive the university as already having a number of high-level IT and cost management system initiatives that are working well. This finding could be another reason to support the findings on why there is a high unwillingness to change the overhead costing system in the university. In addition, other cost management system initiatives may also impede the adoption and implementation of ABC because they, too, need considerable time and effort (Krumwiede 1998).

Comparison of academic and finance staff

Table 3 shows that there was a statistical difference ($p < 0.05$) between the perceptions of academic and finance staff on the influence of IT on the adoption and implementation of ABC at DUT. This finding shows that finance and academic staff perceive the university's IT as well as cost management system initiatives differently.

Perceptions of academic and finance staff on 'system adaptability' as a benefit or barrier to activity-based costing adoption and implementation at Durban University of Technology

The study shows that the majority (63.6%) of finance staff disagreed (strongly disagree = 9.1%; disagree = 54.5%) with the statement that 'there are sufficient skills as well as continuous training of employees for adopting, designing and implementing ABC'. This shows that finance staff perceives the need for continuous training in adapting and implementing a new system such as ABC. Fifty per cent (50.0%) of the finance staff also disagreed (disagree = 22.7%; strongly disagree = 27.3%) with the statement that 'there is consensus about and clarity on the objectives of the ABC

system in the accounting department'. Furthermore, 31.8% of the respondents disagreed (disagree = 13.6%; strongly disagree = 18.2) and 31.8% were unsure about the statement that 'there is sufficient top management involvement to support the adoption and implementation of ABC'. The impact of top management support on the successful implementation of ABC is well researched and it has been proven that a strong correlation exists between the level of top management support and the successful implementation of ABC (Madwe 2017). One explanation for this strong correlation could be that finance staff may not see the need for change without the support from top management (Garrison et al. 2015).

According to a respondent (A3):

'Top management plays a major role in adopting innovations, including ABC, at DUT. However, currently, top management has not shown a strong active support for the adoption or implementation of ABC. The objectives and benefits of the adoption and implementation of ABC are currently not shared.' (male, aged 55–65, HOD)

This indicates that top management support in finance would be influential in the adoption or rejection of ABC at DUT. On the contrary, Fei and Isa (2010) found that a lack of top management support was not a major problem when implementing ABC in SA. The results show that the majority (72.9%) of finance staff agreed (agree = 63.8%, strongly agree = 9.1%) with the statement that 'there is a high participation of relevant external consultants in all cost management system initiatives'. Garrison et al. (2015) alluded to the fact that ABC requires adequate resources that include relevant external consultants for its implementation to be successful. Therefore, this factor would positively influence the adoption and implementation of ABC in the university.

Comparison of academic and finance staff

From the above, it can be deduced that the views expressed by academic and finance staff were not similar. This assertion

TABLE 3: Independent *t*-test on barriers and or benefits of information technology.

Designation	<i>N</i>	Mean	Std. deviation	Std. error mean	<i>p</i>
Scoring Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	3.2713	0.80285	0.07069	0.015*
Staff from finance department	32	3.7500	0.79806	0.17015	-

Std., standard.

*, Level of significance $p < 0.05$ (2-tailed).

TABLE 4: Independent *t*-test on barriers and/or benefits of system adaptability.

Designation	<i>N</i>	Mean	Std. deviation	Std. error mean	<i>p</i>
Scoring Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	3.3895	0.60184	0.05299	0.045*
Staff from the finance department	32	2.9773	0.87936	0.18748	-

Std., standard.

*, Level of significance $p < 0.05$ (2-tailed).

is supported by the independent *t*-test in Table 4. Significant differences ($p < 0.05$) were observed in the responses of the academic and finance staff. Overall, it may be deduced that staff are unsure of whether DUT would be able to adapt to a new cost management system such as ABC.

Perceptions of academic and finance staff on 'environmental or contextual factors' as benefits or barriers to activity-based costing adoption and implementation at Durban University of Technology

Contrary to the responses by the academic staff on whether 'there is a high participation of relevant external consultants in all cost management system initiatives', the study shows that with regard to whether 'there are little cost distortions in the system to warrant the adoption of ABC', 45.5% of finance staff agreed (strongly agree 9.1%; agree = 36.4%), 18.2% of the finance staff disagreed (strongly disagree = 9.1%; disagree = 9.1%) and 36.4% of the respondents were unsure. The pattern of responses of finance staff to the statement, 'ABC can only be adopted and implemented at DUT after being initiated by the Ministry of Higher Education and Training and the regulatory environment', was similar to that of academic staff. This indicates that finance staff also considers the implementation of ABC as being an internally motivated process that does not need to be initiated by the Ministry of Higher Education or regulatory bodies.

Finance staff also provided responses that were similar to those of academic staff regarding the alignment of ABC with the university's performance evaluation and compensation structure. This link is essential as it convinces employees that rewards depend on their behaviour and the resulting system demonstrates their performance and reflects their future compensation (Garrison et al. 2015). The link between performance evaluation and ABC has been empirically demonstrated and is considered crucial for its successful implementation (Garrison et al. 2015). When staff continue to be evaluated and rewarded using traditional cost systems, they perceive ABC as not being important and may abandon it (Garrison et al. 2015). Notwithstanding this, half (31.8%) of the finance staff agreed (agree = 27.3%; strongly agree = 4.5%) that there are difficulties in collecting data at DUT necessary for the implementation of a new cost management system initiative, such as ABC. However, the fact that they agree (72.7%) with the statement, 'the organisational goals and culture of the university are well aligned with an ABC initiative', indicates that the DUT culture and goals might positively influence the adoption and implementation of ABC.

Comparison of academic and finance staff

From the foregoing, it can be construed that academic and finance staff generally perceive the university environment as being conducive to an ABC system with academics attributing the lack of ABC as leading to cost distortions and finance staff perceiving that the ABC system would be well aligned with the current performance and evaluation structure of the

university. However, both groups of staff perceive the ABC system as being difficult to adopt and implement at DUT. Hence, both groups of staff may not welcome a new costing initiative, such as ABC, as they perceive it to be a system that poses many changes and challenges. This is consistent with the responses where the majority of the respondents expressed an unwillingness to change the current system but rather improve on it, if possible.

Table 5 shows a comparison of the perceptions of academic and finance staff on the barriers and/or benefits of environmental or contextual factors. The results indicate that academic staff and finance staff at DUT have different views on the overall influence of environmental or contextual factors on the adoption and implementation of ABC at the DUT. The independent *t*-test shown in Table 4 revealed a significant difference ($p < 0.01$) in the views expressed by both respondent groups. This suggests that academic and finance staff perceive the influence of environmental or contextual factors in adopting and implementing overhead costing at DUT differently.

Perceptions of academic and finance staff on 'organisational structure' factors as benefits or barriers to activity-based costing adoption and implementation at Durban University of Technology

This section discusses the perceptions of academic and finance staff on organisational structure as a benefit or barrier to ABC adoption and implementation at DUT. Research results show that the majority (88.4%) of academic staff agreed (agree = 68.2%; strongly agree = 20.2) with the statement that 'the organisational structure of the university can positively influence the university's ability to implement ABC'. Similarly, 92.2% (agree = 58.1%; strongly agree = 34.1%) of the academic staff perceive the large size of the university as warranting the adoption of a sophisticated system, such as ABC. Studies on ABC have suggested that there is a link between the size of an organisation and the adoption of modern management accounting practices, such as activity management or ABC. The arguments for this link include that larger organisations have a high demand for activity management information for planning, control and coordination of activities; larger communication networks; the necessary infrastructure or resources for the development and implementation of activity management practices; and more resources are available to activity management practices (Elagili 2015).

Similar to the scoring by academic staff on organisational structure, the majority of finance staff (72.7%) agreed (agree = 50.0%; strongly agree = 22.7%) with the statement that 'the organisational structure of the university can positively influence the university's ability to implement ABC'. Moreover, the study shows that 81.9% (agree = 45.5%; strongly agree = 36.4%) of the finance staff perceive the large size of the university as warranting the adoption of a sophisticated system, such as ABC.

Comparison of academic and finance staff

The results indicate that academic and finance staff agreed or strongly agreed that the organisational structure at DUT can positively influence the university's ability to implement ABC. Similarly, Madwe (2017) reported the significance of organisational structure in the adoption and implementation of ABC. Centralised and formal organisations, such as public universities, have significantly been associated with the successful adoption and implementation of ABC. However, contrary to these findings, Naidoo (2011) suggested that the organisational structure in universities that involves tracing costs at faculty or departmental level is a hindrance to the adoption and implementation of ABC.

The results suggest that academic and finance staff have similar views on the influence of the organisational structure on the adoption and implementation of ABC at the DUT. The independent *t*-test highlighted in Table 6 revealed that there is no significant difference ($p > 0.05$) in the views expressed by both designations. This suggests that both the academic and finance staff view the influence of the organisational structure in adopting and implementing overhead costing at DUT in a similar manner.

Perceptions of academic and finance staff on 'technical factors' as benefits or barriers to activity-based costing adoption and implementation at Durban University of Technology

This section discusses the perceptions of academic and finance staff on technical factors as benefits or barriers to ABC adoption and implementation at DUT. These results are shown in Table 7.

Contrary to the views of most academic staff, finance staff mainly perceived ascertaining and grouping activities for ABC, as well as grouping activities into cost pools for

TABLE 5: Independent *t*-test on barriers and or benefits of environmental or contextual factors.

Designation		N	Mean	SD	SE mean	p
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	2.7628	0.48462	0.04267	0.000**
	Staff from the finance department	32	3.2818	0.43495	0.09273	-

SD, standard deviation; SE, standard error.

**, Level of significance $p < 0.01$ (2-tailed).

TABLE 6: Independent *t*-test on barriers and or benefits of organisational structure.

Designation		N	Mean	SD	SE mean	p
Scoring	Academic staff in the Faculty of Accounting and Informatics or Management Sciences	129	4.1705	0.48209	0.04245	0.160
	Staff from the finance department	32	3.9545	0.67098	0.14305	-

SD, standard deviation; SE, standard error.

ABC, as being difficult in a university setting. This finding agrees with the findings from interviews conducted by Nair and Tan (2018) that it is difficult to collect the appropriate data and to define cost pools and cost drivers. Likewise, the level of agreement between most of the academic staff and finance staff was high that there is limited knowledge on the exact data requirements needed to implement ABC.

Interviews

The interviews sought to probe staff on why there was a high level of reluctance to change the current overhead costing system. The following were the major responses from the interviews

- The current system allows for cross-subsidisation that is essential in preserving those programmes that are closely attached to the university brand and have a positive contribution to DUT, such as Art and Design, Health Sciences and Engineering. An example cited in the interviews with a respondent (A3) was that the faculty of Art and Design has specialised cost activities, such as ceramic, weaving and sculpturing. These activities consume high indirect costs that may result in high incidences of loss-making departments. However, cross-subsidisation allows the losses to be absorbed by the system. Broad and Crowther (2001) supported this finding in a survey carried out in universities in the UK that showed that these universities offer a range of courses in various portfolios, not purely for financial reasons, but on academic grounds as well.
- The current system is viewed as a specialised, educational system that gives appropriate cost information (A2), particularly for reporting purposes. Some staff in the finance department argued in the interviews (A2 and A3) that cost activities in the university are complex and interwoven, which may render the identification of multiple as well as appropriate cost drivers for assigning resources to activities difficult and expensive. Langfield-Smith et al. (2018) supported this view, suggesting that it

can be difficult to implement ABC in services organisations such as universities because of the non-repetitive activities, difficulties in identifying and measuring service outputs as well as the high facility level costs.

- Respondent (A1) also highlighted that costs in the university are perceived as being predominantly labour that is estimated to be above 63% of the total expenditure. In a similar study in the UK, Broad and Crowther (2001) also argued that if a course proved to be making a deficit using full absorption costing, the removal of that course would only eliminate the marginal costs of its delivery, such as part-time teaching hours, printing and possibly costs of staff who were solely teaching the course. The overheads, such as depreciation, that caused the course to show an accounting loss would still have to be absorbed by the other courses in the university.
- According to the follow-up interviews (A3, A2), DUT is operating at a profit or surplus and the unwillingness may also be attributed to '*resistance to change*'. The finding on responses from finance staff ('there is no internal resistance from relevant staff to the adoption and implementation of ABC' statement 8.26) also supports this finding. Xu (2012) argued that a major reason for employees' resistance to the implementation of ABC is the fear of the changes associated with business process re-engineering, lack of training and poor communication between relevant departments sharing indirect costs.

It appears that, generally, the respondents are relatively satisfied by the current system. Similar findings have shown that organisations that were generally more satisfied with their existing cost accounting system were unwilling to adopt and implement ABC (Cohen, Venieris & Kaimenaki 2005).

However, because tracing of costs tends to occur at faculty as well as departmental level, these findings imply that a proper analysis of costs and the relevant cost drivers is lacking. If costs were traced from course and student type level, then an audit trail would be readily available. Work undertaken by

TABLE 7: Perceptions of academic staff on technical factors as benefits or barriers in the adoption and implementation of activity-based costing at the Durban University of Technology.

Question	No.	SD	D	Unsure	A	SA	Mean	Standard deviation	p
Academic staff n = 129									
There are difficulties in identifying and grouping activities for ABC.	129	0.0%	24.8%	10.9%	56.6%	7.8%	3.47	0.953	0.000**
There are difficulties in grouping activities into cost pools for ABC.	129	0.0%	25.6%	9.3%	55.0%	10.1%	3.50	0.985	0.000**
Cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult.	129	8.5%	44.2%	6.2%	22.5%	18.6%	2.98	1.329	0.000**
There is limited knowledge on the exact data requirements needed to implement ABC.	129	2.3%	23.3%	27.1%	35.1%	11.6%	3.31	1.029	0.000**
Finance staff n = 32									
There are difficulties in identifying and grouping activities for ABC.	32	4.58%	9.1%	9.1%	54.5%	22.7%	3.82	1.053	0.001**
There are difficulties in grouping activities into cost pools for ABC.	32	4.5%	13.6%	4.5%	50.0%	27.3%	3.82	1.140	0.003**
Cost activities in the university are complex and interwoven, which may render the identification of appropriate cost drivers for assigning resources to activities difficult.	32	0.0%	18.2%	4.5%	54.5%	22.7%	3.82	1.006	0.008**
There is limited knowledge on the exact data requirements needed to implement ABC.	32	9.1%	13.6%	0.0%	45.5%	31.8%	3.77	1.307	0.070

A Likert scale of 1 = strongly disagree (SD), 2 = disagree (D), 3 = unsure, 4 = agree (A), 5 = strongly agree (SA) was used. ABC, activity-based costing.

**, Level of significance $p < 0.01$ (2-tailed).

KPMG, the JCPSG (Broad & Crowther 2001) and the Higher Education Funding Councils in the UK has suggested ABC as an appropriate tool for costing activities such as teaching, research and other educational studies. Through surveys and possibly through interviews with HODs and finance staff, DUT can determine its own activities in faculties, such as teaching, research, service and administration to enable the adoption and implementation of ABC (Cox, Downey & Smith 1999).

Discussion

Barriers and facilitators of activity-based costing adoption and implementation

Strategy, organisational structure, environmental or contextual factors, behavioural and organisational factors, IT, decision usefulness of cost information, technical and internal systems or systems adaptability (as identified in the contingency theory) are identified as barriers and facilitators of ABC adoption and implementation.

Strategy

A number of factors were perceived as facilitators of the implementation of ABC in a South African state university as indicated by findings at DUT. Both academic and finance staff overwhelmingly agreed that the current strategic initiatives at the university support innovation and would most likely fully support a new initiative such as ABC. However, academic staff did not agree that ABC would be aligned with the competitive strategies and continuous improvement programmes within the university. Perceptions of strategy as a factor at DUT are positively associated only with ABC knowledge and job title (Table 8). This may indicate that respondents with more knowledge of ABC and a more senior job title may view strategy as more necessary for ABC adoption.

Information technology

Furthermore, both academic and finance staff perceive the university as already having a number of high-level IT and cost management system initiatives that are running smoothly within the university. This finding is a possible explanation for why staff are unwilling to change the current overhead costing system. This is supported by previous

studies that suggest that organisations with high levels of IT and cost management system are usually reluctant to adopt and implement ABC (Nair & Tan 2018).

Behavioural and organisational factors

A number of factors that could also positively influence the adoption and implementation of ABC at DUT were highlighted under the behavioural and organisational factors. The perception by both academic and finance staff that ABC could facilitate more efficient financial management for universities under budgetary constraints is worth noting. However, both groups of staff perceive the ABC system as being difficult and complex to adopt and implement at DUT. Hence, both groups of staff may not welcome a new costing initiative, such as ABC, as they perceive it to be a system that poses many changes and technical challenges. In fact, when asked to rate their willingness to change the current overhead costing system, the majority of the respondents expressed an unwillingness to change the current system but rather improve on it, if possible.

Environmental or contextual variables

However, both academic and finance staff generally perceive the university environment or context as being conducive for an ABC system with academics attributing the need for ABC to address cost distortions and finance staff perceiving the ABC system as being well aligned with the performance and evaluation structure of the university. Perceptions of environmental or contextual factors at DUT are associated with age, level of education, ABC knowledge and job title (Table 8). However, there is no association between the perceptions of environmental or contextual factors with gender or time at DUT. It is worth noting the strong negative relationship between the environmental or contextual variables and ABC knowledge. This shows that the better the ABC knowledge, the more the respondents view the current cost information as inadequate or that there is room for improvement.

Decision usefulness

Another example is the outcome of the perceptions on decision usefulness of cost information that is negatively associated with age, level of education and ABC knowledge

TABLE 8: Spearman correlations between demographic variables and the investigated factors.

Factors	Spearman's correlation	Gender	Age	Level of education	Time at DUT	ABC knowledge	Job title
STR	Spearman's correlation	-0.094	-0.158*	-0.313**	0.054	0.171*	0.294**
	Sig. (2-tailed)	0.185	0.024	0.000	0.449	0.015	0.000
	<i>n</i>	73	73	73	73	73	73
DU	Spearman's correlation	-0.068	-0.151*	-0.270**	0.061	-0.162*	0.254**
	Sig. (2-tailed)	0.339	0.032	0.000	0.388	0.021	0.000
	<i>n</i>	73	73	73	73	73	73
ENV	Spearman's correlation	-0.071	0.154*	-0.270**	0.021	-0.187**	0.224**
	Sig. (2-tailed)	0.313	0.028	0.000	0.765	0.008	0.001
	<i>n</i>	73	73	73	73	73	73

STR, strategy; DU, decision usefulness of cost information; ENV, environmental or contextual factors; ABC, activity-based costing; DUT, Durban University of Technology.

*, Correlation is significant $p < 0.05$ (2-tailed); **, Correlation is significant $p < 0.01$ (2-tailed).

(Table 8). This shows that the higher the level of education and ABC knowledge, the less the respondents view the current decision usefulness of cost information as adequate and that they consider that changing the current overhead costing system should be a strategic priority in the university.

Internal system adaptability

Most hindrances to the adoption and implementation of ABC in the university were mainly highlighted on organisational factors under the selected theme, system adaptability. These factors include the availability of continuous training and top management support for ABC. However, one enabling factor was identified under the system adaptability theme. The results showed that staff alluded to the fact that there are relevant external consultants if ABC was to be successfully adopted and implemented in the university. Studies show that the amount of assistance from external consultants influences the success of the implementation of ABC as outside consultants have specialised knowledge on ABC that can be used to the benefit of their clients. Therefore, the perceived technical hindrances that were observed in the results identified could be minimised significantly by an external consultancy.

The researcher had initially anticipated different outcomes from this study, considering that South African universities operate with varying resources compared to other institutions. However, the findings of the study are consistent with the results reported in the literature. For instance, the study found that high levels of IT and cost management systems in organisations can lead to reluctance in adopting and implementing ABC, which is consistent with the literature (Akgün et al. 2023). Similarly, the perception of ABC as being complex and difficult to adopt and implement is a well-known barrier to ABC adoption that has been identified in previous studies (Da Silva Etges et al. 2022; Kitsantas et al. 2022). On the other hand, the study's finding that external consultants can significantly minimise technical hindrances in the adoption and implementation of ABC is consistent with the literature (Gosselin 1997). Moreover, the study's finding that decision usefulness of cost information is negatively associated with age, level of education, and ABC knowledge is consistent with previous research that suggests that the decision-making usefulness of cost information is a function of the user's knowledge and experience (Pashkevich et al. 2023).

Conclusion

The study aimed to identify key factors influencing the adoption and implementation of ABC in the university. The study shows that the adoption and implementation of ABC are influenced by various factors, including strategy, organisational structure, environmental or contextual factors, behavioural and organisational factors, IT, decision usefulness of cost information, and technical and internal systems/systems adaptability. The study also revealed that the university's strategic initiatives supported innovation but were not aligned with competitive strategies and continuous

improvement programmes. The university already had high-level IT and cost management systems, which made staff reluctant to change the current overhead costing system. The perception of ABC as complex and difficult to adopt and implement was a significant barrier, but the university environment was perceived as conducive to ABC. Decision usefulness of cost information was negatively associated with age, level of education, and ABC knowledge. Finally, staff identified the availability of external consultants as an enabling factor in the adoption and implementation of ABC. Therefore, organisations should carefully consider these factors and take appropriate measures to overcome the barriers and leverage the facilitators in implementing ABC. There are several areas where future studies can be conducted to further explore and refine the ABC approach. Some potential areas of research in ABC include time-driven ABC in universities and ABC integration with emerging technologies, industry-specific applications, cost-benefit analysis, and sustainability reporting.

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