

Management Accounting Change: Perceived Characteristics of Innovation on the Adoption of Activity-Based Costing for Private University in Malaysia by Using the Roger Theory

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Abstract

The research aims to explore the factors influencing the adoption of Activity-Based Costing ABC in higher education institutions, specifically in private universities in Malaysia. It also aims to fill the research gap in adopting ABC in the higher education sector. The study will investigate the perceived characteristics of innovation, such as relative advantage, compatibility, complexity, trialability, and observability, and their relationship to the adoption of ABC. This article focuses on the adoption of activity-based costing (ABC) in private universities in Malaysia. ABC is a management accounting process that assigns resource costs to products based on activity. This research will also examine the moderating effect of the stakeholders on the relationship between these perceived characteristics and the adoption of ABC. The study will use quantitative research methods, including surveys and statistical analysis, to collect and analyze data. The findings of this research will contribute to the understanding of the adoption of ABC in the higher education sector and provide insights for decision-makers in implementing ABC in universities. The results suggest that Rogers' theory has some probative value because, according to existing research, relative advantages and trialability are important factors in the adoption of ABC. We will describe the finding of positive but non-significant effects on complexity, compatibility, and observability to the nature of ABC as an administrative innovation disseminated among organizations, as opposed to the origin of the theoretical framework as applied to technical innovations disseminated among individuals.

Keywords: Adoption, Activity-based Costing, Higher Education, Perceived Characteristics, Innovation Rejection

Introduction

Activity-based costing techniques have come a long way in the last ten years Cooper (1990) and are said to avoid the shortcomings of traditional absorption costing techniques, which typically allocate indirect costs through direct labor (Dugdale, 1990). ABC is a management accounting technique that allocates resource costs to products based on activity. Activity is the factor that generates the costs of products and services. Over the last ten years, several surveys indicate that the adoption and use of the ABC method have increased in developed countries (Baird et al., 2004). By using ABC, managers can better understand the costs associated with significant activities, the factors that contribute to those costs, and the adjustments needed to reduce those costs. ABC also provides managers with information that helps them make better decisions about how to allocate resources. ABC continues to grow and spread, making it useful in academic and professional contexts. Turney (1996) provides an in-depth analysis of the theoretical basis of activity-based accounting, in particular the principles of activity coverage and the cost variables, linking activity-based costing and the initial management accounting system. This is largely due to the wide adoption of the ABC model by a wide variety of non-producing companies. Examples include the aircraft, automotive, military, and electronic industries (Ozcan et al., 2020). ABC also rapidly spread from us into western industrial countries during the 1980s. It is important to note, however, that ABCs do not have universal adoption and vary by industry, sector, and company (Alsayegh, 2020). The adoption of ABC in developing countries was slower and less pronounced than that of developed countries. As the world continues to evolve, higher education is one of the areas facing the greatest challenges.

The digital revolution has had a huge impact on higher education institutions, and to respond positively to these challenges, universities must invest heavily in ICT projects and e-learning and develop comprehensive campus information systems to better support their strategic objectives (Qayoumi, 1996). However, these investments will only add to the increasing costs of higher education, which is why a cost management system would be essential, as it would provide university management with the information and feedback necessary to generate value for the institution (Robertson et al., 1998). Managing modern universities is one of the biggest challenges universities face today, and university leaders need to find a cost management methodology that can integrate accounting data with the university's strategic plan and performance measures. An alternative costing method that can do this is activity-based costing, which can accurately determine the actual cost of providing a product or service. The adoption of Activity-Based Costing (ABC) within higher education institutions, particularly private universities in Malaysia, presents a significant area of study with substantial implications for effective management and resource allocation. In an increasingly competitive and resource-constrained environment, universities must optimize their financial and operational efficiencies to sustain and enhance their educational offerings. Understanding the factors influencing the adoption of ABC in this sector is vital for several reasons (Duron, 2001; Evans, 2004; Granof et al., 2000).

Firstly, ABC provides a more accurate method of cost allocation compared to traditional costing systems. It assigns resource costs to products and services based on actual activities, leading to better decision-making and resource management. In the context of private universities, where financial sustainability is crucial, the precise allocation of costs can lead to more informed budgeting and financial planning (Alejandro, 2000; Krishnan, 2006; Newman,

2003). This is especially important in a sector that faces unique financial challenges, such as fluctuating student enrollments, varying tuition fees, and the need to maintain high standards of education with limited resources. Secondly, this study aims to fill a significant research gap. While the adoption of ABC has been extensively studied in manufacturing and other sectors, its application in higher education remains underexplored. By focusing on private universities in Malaysia, this research provides valuable insights into a relatively unexamined area, contributing to the broader literature on management accounting innovations in the education sector. The perceived characteristics of innovation, as outlined by Rogers' Diffusion of Innovations Theory, offer a robust framework for understanding the adoption of ABC (Aldukhil, 2012; Jamaluddin, 2015). By examining factors such as relative advantage, compatibility, complexity, trialability, and observability, this study provides a comprehensive analysis of the determinants of ABC adoption. These insights are crucial for stakeholders, including university administrators, financial managers, and policymakers, who are responsible for implementing effective cost management practices.

Since there is a research gap based on the previous research on the adoption of ABC for HEI, this present study will focus more on the adoption of ABC in HEI. Because of the changes in the costing method from the educational method to the ABC method, most recent studies focused on the perceived characteristics of the adoption of ABC for organizations, and various industries Alejandro (2000); Cohen and Hansen (1999); Krishnan (2006); Newman (2003) such as manufacturing, services, constructions, and others, less research focus on the educations institutions. Most of the few prior studies on ABC in higher education institutions focused on a single area of the university administration as a whole; for example, the university library Newman (2003), specific university programs Alejandro (2000); or focused on only a single group of users Duron (2001); Evans (2004); Granof et al (2000) of cost accounting information. Relates to the prior literature, there a several problems highlighted to those issues. Firstly, in terms of the implementation. There needs to be an investigation of whether ABC can be successfully implemented once it has already been put into place for the HEI. Organizational, historical, and technical elements all play a role, although in varying degrees. Traditional costing led the university's management to not have accurate and appropriate information on the exact cost of the services they provided. Their focus is just to provide the costing report to meet the expectations of the external users (Gordon & Fisher, 2011). Secondly, numerous researchers from a wide range of countries have found minimal evidence linking technological difficulties to the adoption of ABC especially in HEI (Duron, 2001; Evans, 2004; Granof et al., 2000). They also believe that ABC's potential success in the workplace is heavily influenced by organizational and environmental factors. Thirdly, the lack of basic knowledge and skill of ABC techniques by employees of the administration of HEI since ABC was complex and required too many detailed records and the fact that ABC was too time-consuming for the personnel and employees' resistance because they do not exactly know ABC. All the problems highlighted are related to the technical and behavioral factors that lead to the refusal of the user to adopt the ABC system. Apart from that, because of the several problems highlighted above it motivated the present study to examine in detail the rate of adoption of ABC.

According to Jamaluddin, (2015), The traditional accounting approach meant that university management did not have a good understanding of the cost of the services they provided. The primary focus of the university management was to meet the requirements of external reporting and the requirements of basic management accounting to the extension of the

general ledger of the institution. Cost-management accounting systems cannot be designed to meet most of the information requirements for financial reporting. Aldukhil (2012) noted that ABC helps the management to focus on the cost of the main activities. This helps the management to understand what causes the cost and what changes need to be made to reduce the cost. However, the use of ABC in the universities has focused mainly on activities of the support departments (libraries, computer support, and payroll and procurement) rather than on all aspects of university operations. Moreover, the study investigates the moderating effect of stakeholders on the relationship between these perceived characteristics and the adoption of ABC. Stakeholders play a critical role in the decision-making process, and their perceptions and attitudes towards ABC can significantly influence its adoption. Understanding these dynamics can help in designing strategies that address stakeholder concerns and facilitate smoother implementation of ABC. The findings of this research have practical implications for private universities in Malaysia and beyond. By identifying the key factors that influence the adoption of ABC, the study provides actionable insights for decision-makers. These insights can aid in the development of targeted interventions and support mechanisms that enhance the adoption process, ultimately leading to improved financial management and operational efficiency in universities.

From a financial perspective, there is no additional burden on the government as resources are limited. This is because the expenditure per student in private universities has, in many cases, been less than 50% of the expenditure of public universities. Public and private universities have been developed in different ways and contexts, but the exact calculation of the cost per student or program is still needed. Private universities need an exact cost to measure their performance in terms of financial numbers, whereas, for public universities, an exact cost is needed to measure efficiency and to increase accountability for how public resources were used to achieve a particular targeted outcome. The aims of this study will explore the HEI's role in ABC adoption by building the research objectives using innovation diffusion theory (IDT). In examining the factors that influence the adoption of innovations, innovation diffusion theory (IDT) suggests that characteristics of innovations such as relative advantage, compatibility, complexity, observability, and trialability influence the rate of adoption of ABC. In conclusion, studying the adoption of Activity-Based Costing in private universities in Malaysia is essential for advancing the understanding of management accounting practices in the higher education sector. This research not only fills a critical gap in the literature but also offers practical benefits for stakeholders involved in the financial and operational management of universities. By emphasizing the utility and effectiveness of ABC from the outset, this study underscores its potential to drive positive change and improve resource allocation in higher education institutions.

Literature Review

Activity Based Costing (ABC)

Activity Based Costing (ABC) is a cost accounting system designed to help organizations better understand and plan for their costs. It is used to influence planning, management, and decision-making. The main purpose of ABC is to gain an edge over competitors and to create more precise product costing (Hoo, 2010). With better costing, an organization can focus on activities that generate value (Ozcan, 2020). The adoption and successful implementation of ABC have varied around the world (Duh et al., 2009). The reasons for this vary depending on the organization, culture, and technical and technological factors (Ahmadzadeh et al., 2011; Alcouffe, 2002; Brierley, 2008; Brown et al., 2004; & Malmi, 1997). In the manufacturing

industry, the traditional costing method, where overhead costs are allocated on the average cost of a product, is the earliest and most traditional method. At that time, due to the lack of technological progress, the industry had to heavily rely on manual labor in the manufacturing and production process. Although labor costs were low, this added to the total cost of labor over overhead costs (Horngren et al., 2012). In the services industry, the largest part of costing is usually fixed cost, which is usually tied to overhead costs and can have a significant impact on total cost. In the services industry, traditional methods are also not suitable due to inaccurate cost drivers which lead to unit cost distortion and hence pricing decisions (Abdullah & Tareq, 2012).

In the case of higher education institutions in Malaysia, it was also found that the traditional methods of determining student costs were not relevant. For instance, in the research at UTM Anbalagan (2006), found that ABC provides more precise costing information to the management. It helps in highlighting relevant costs, over- and under-costs, and identifies value-added costs and non-value-added costs. Ruhanita et al (2011) supported this finding by providing evidence that ABC is an effective tool for measuring the relationship between the costs of a university and its output (services). The findings showed that the ABC method could be used to analyze information related to the resources used, which would help management determine a more precise and competitive price policy for each service provided.

Table 1

Comparison between Traditional Costing and ABC.

Traditional cost (TC)	Activity-based costing (ABC)
Overhead costs are accumulated and assigned to products by organizational structure (that is, departments or cost centers), based on the number of resources used by the product.	Overhead costs are accumulated and assigned to products by activities, based on the number of resources used by each product.
Multiple overhead rates are calculated: one per department or cost center.	Multiple overhead rates are calculated: one per activity.
The allocation basis is usually based on volume measure and does not necessarily represent a cause-and-effect relationship between the cost and the allocation basis.	The allocation basis is referred to as a "cost driver", as a cause-and-effect relationship exists between the cost and the allocation basis.
The allocation basis is an easily measured and traceable one, and a limited number of bases are used; the costing system is not prohibitively expensive to implement and operate.	Because of the extensive number of cost drivers that must be identified and measured, this costing system can be prohibitively expensive to implement and operate.
Overhead cost accumulated in service departments is reallocated to production departments. A rate that is applied to products is then determined for each production department.	Overhead cost related to service activities is not reallocated to product departments or activities first and then to the products. The cost driver for the service cost is used to allocate the service-related overhead directly to the products.
Result: Overheads are averaged out between products. The overheads assigned to products are not representative of the	Result: The allocated overhead reflects the extent to which that product causes costs to be incurred. In other words, the overhead

<p>long-term cost savings if the product in question were not produced. Consequently, this method of allocation does not support strategic or long-term decision-making.</p>	<p>allocated represents the amount that could be saved in the long term if the product were not produced. Consequently, this method of allocation supports strategic or long-term decision-making.</p>
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Source: Roos et al (2011: 166)

Managers should exercise caution when selecting a costing system to calculate the cost of goods and services. Due to the changing trading environment, the costing system has been developed and updated to meet current requirements. As a result, the cost accounting system has been replaced by activity-based costing, which has been able to address the existing weaknesses in the cost accounting system. While this system has significantly improved the existing system, the high costs associated with interviews, performances, and updates necessitated the researchers to consider the development of a new system to address the errors. The data obtained is more accurate and precise, which assists in making managerial decisions. It is now possible to use Time-Triggered Activity-Based costing, which involves the use of the time factor to allocate costs to activities.

The ABC and Diffusion Theory

The ABC diffusion process is a process, and there may be a lag between the beginning and the end of the process. It is also possible that the concept is not entirely diffuse at all. For diffusion researchers, the measurement of diffusion as a variable is of great importance, as inaccurate measurement may lead to misinterpretation of the results. A distinguishing feature of the ABC technique is that it pays attention to the emergence of new operational phenomena, as well as the impact of dominant technology, on the current situation. The main distinctions between the ABC and the TC techniques are how cost pools are defined and how costs are allocated to activities at a structural level (Tan & Feng, 2023). According to the Tan & Feng framework, the TC allocation strategies involve direct labor costs and material costs, as well as processing time. Furthermore, the innovative action-based costing method uses orders and production units, as well as work hours and machine hours, to measure and allocate overhead expenses. The table below shows the details of the comparison between TC and ABC.

The idea for the conceptual framework comes from the diffusion of innovation theory (IDT) by (Rogers, 2003).

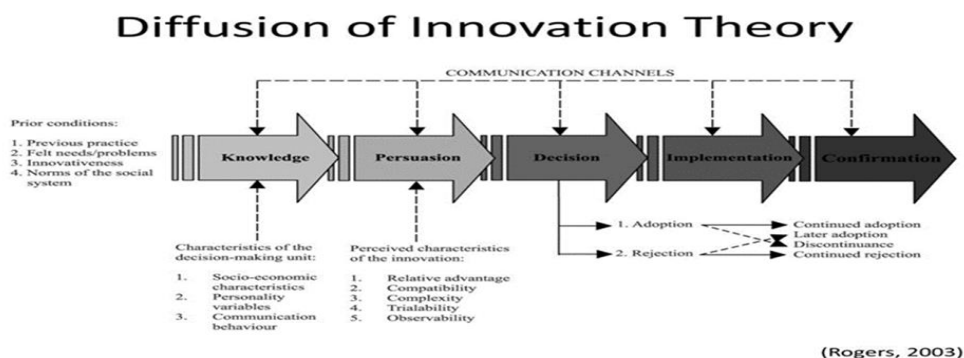


Figure 1: Diffusion of Innovation Theory (IDT) by Rogers, (2003)

The conception framework for this study is most focused on persuasion which consists of perceived characteristics of innovation. Rogers (2003) described the innovation-diffusion process as an uncertainty reduction process, and he proposes attributes of innovations that help to decrease uncertainty about the innovation. Perceived characteristics of innovations include five characteristics of innovations: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Furthermore, Rogers (2003) stated that individuals' perceptions of these characteristics predict the rate of adoption of innovations. Also, Rogers noted that although there is a lot of diffusion research on the characteristics of the adopter categories, there is a lack of research on the effects of the perceived characteristics of innovations on the rate of adoption. Along with that, because of the lack of study done on the perceived characteristics of innovation and not many studies focus on HEI, this study will focus on the adoption of ABC (focusing on perceived characteristics of innovation) in higher educational institutions.

Research Gap

The usage of ABC in companies has been examined for a long time. A few researchers have inspected different angles of the ABC framework, giving bits of knowledge into the utilization of ABC in particular segments and businesses, and inspected the significance of elective variables in ABC appropriation, the effect of ABC selection on organizations, and the effect of ABC selection on organizations. The focus of this review is the issues discussed in previous studies related to ABC adoption in organizations. However, this study highlights the issues related to ABC adoption in higher education institutions (HEI).

Even though the use of Activity-based Costing (ABC) is rapidly gaining favor in service organizations Alejandro (2000); Cohen and Hansen (1999); Krishnan (2006); Newman (2003), very limited research has been done on the usefulness of ABC in a public service setting such as the higher education sector. Most of the few prior studies on ABC in higher education institutions focused on a single area of the university administration as a whole; for example, the university library Newman (2003), specific university programs Alejandro (2000); or focused on only a single group of respondents such as users of cost accounting information (Duron, 2001; Evans, 2004; Granof et al., 2000).

Table 2

Summary of ABC Studies in Higher Education

Author/s	Research area/objectives	Method/s	Sample / Size	Main findings
Granof et al., (2000)	<ul style="list-style-type: none"> To address specific problems of managing the university enterprise To demonstrate an improved conceptual 	Case Study: Interview/observation/questionnaires	Seven programs are offered under the accounting department at the University of Texas in Austin.	<ul style="list-style-type: none"> ABC measures the full cost of programs and activities and proves to provide efficient information in a large

	<p>model for measuring the costs of services for research services, teaching, and PhD advisory.</p>			<p>academic department.</p> <ul style="list-style-type: none"> • E.g., disparities exist within departmental programs, unused capacity is costly, support services do not benefit programs uniformly, and space costs are significant.
Newman (2003).	<ul style="list-style-type: none"> • The benefits of ABC to an academic library with regards to information provided. 	Case Study: Interview with staff to identify key activities and time.	Included three faculties (Business, Health & Education) across two main sections: (1) circulation, and (2) reference at Churchland's Library which serves Edith Cowan University (ECU) and the University of Western Australia (UWA), Perth, Australia.	<ul style="list-style-type: none"> • ABC provides multiple types of information (strategic planning and operational). • The individual activities become the central cost focus. • ABC can determine value-adding and non-value-adding for cost savings.
Alejandro (2000).	<ul style="list-style-type: none"> • ABC as an estimating model to measure the cost of selected academic programs 	Case Study using secondary data and interviews with staff to identify activities and time.	Central overhead and academic support for the Undergraduate Accounting Programme, at Baylor	<ul style="list-style-type: none"> • ABC information is important to assist administrators in evaluating whether an additional student or class

			University's Hankamer School of Business (HSB).	will result in either positive or negative net revenues. • Able to calculate the breakeven point for a course
Cook (2003).	<ul style="list-style-type: none"> • To develop the ABC Model to administer, develop, deliver, and maintain courses for various modes of studies. • To compare the costs of different modes of study. 	Case Study: Interview with staff to identify time, activities, and cost drivers	Three modes of distance education, namely: Text-based, primarily video-based, and online courses at Washington State University (WSU).	<ul style="list-style-type: none"> • Accurate cost of the course type. • Overstatement of cost for specific modes of course delivery e.g., the text-based expense is lesser than the previous, although it is also able to support an updating cost of the courses.
Evans (2004).	<ul style="list-style-type: none"> • ABC model to measure cost for different groups of students. 	Case Study: interviews, internal studies, and random moments time studies	Five different groups of students at St. Edward University, US: (1) Traditional Undergraduate, (2) Graduate, (3) New College, (4) Continuing Professional Education (CPE), and (5) College of Professional and Graduate Studies.	<ul style="list-style-type: none"> • New Colleges and Graduate students generate relatively larger portions of revenue in comparison to Traditional Undergraduate students

Variables

Dependent Variable

The dependent variable focuses on the acceptance of the adoption of ABC. This variable will be measured by the questionnaires to the respondents. The respondents will be asked to answer the question regarding ABC adoption in their university.

Independent Variable

Rogers (2003) explains the Diffusion of Innovations theory offers a time-tested framework to parse out some of the factors that may have contributed to an innovation's success or failure. Rogers provided a framework to compare a large number of innovations using a common vocabulary and set of metrics. He defined diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. In a series of diffusion studies across multiple areas, Rogers (2003) found that innovations have these 5 characteristics which consist of high relative advantage, trialability, observability, compatibility, and complexity. By referring to this theory, this study came up with the idea to examine the 5 innovation characteristics that it calls perceived characteristics towards the adoption of the ABC system.

Relative Advantage

Relative advantage is the degree to which an innovation appears to be better than any other alternatives the potential adopter might have, measured in terms of economics, convenience, satisfaction, and social prestige. Innovations do not typically exist in a vacuum and must compete with other innovations looking to serve the same purpose.

Trialability

Trialability is the degree to which the innovation can be experienced firsthand on a limited basis. For example, pills for weight control are certainly more triable than having one's stomach surgically tied and are tried with far more frequency, despite their limited effectiveness. The ease with which the product or service can be tested and tried also determines the rate of acceptance. The higher the degree of trialability, the greater would be the rate of diffusion.

Observability

Observability is the degree to which the innovation or its results can be seen by others likely to adopt it. If potential adopters are unaware of the innovation or do not see it being used by their peers, they are less likely to adopt it themselves. If a tree falls in a forest, does it make a sound? Observability in an innovative product refers to the degree to which a product/service's benefits can be observed, imagined, and perceived by a potential consumer. The higher the degree of observability, the greater the chances of the innovative offering being accepted by the prospects.

Compatibility

Compatibility is the degree to which the innovation is seen as consistent with existing values, previous experiences, and needs of the user. Innovations exist among other innovations and rest on the experiences potential adopters have had with other innovations and their values and beliefs. Some innovations may be seen as a part of a larger group of innovations, known as a technology cluster, and may be judged by potential adopters within the context of the

group, rather than individually. The compatibility of the innovative product and service offering with the existing backgrounds, behavior, and lifestyle patterns of consumers also affects its adoption by the consuming public. The compatibility of a product/service measures how closely it relates to needs, value systems and norms, lifestyles, culture, etc.

Complexity

Complexity is the degree to which the innovation is seen as difficult to understand or use. People are less likely to adopt hard-to-use or complex products. The level of complexity in product purchase and usage also affects the diffusion process. An innovative offering would be easily diffused when there is ease of understanding, purchase, and use. The easier it is to understand and use a product, the more likely it is to be accepted quickly, and vice versa.

Moderating Variables

The present study adopted the guidelines as outlined by Jarrar et al. (2007) to classify two stakeholders of the HEI as can be seen in the Table below. This means that the users can also be considered as preparers but they are not the persons that need to justify the amount during budget preparation. Their main duty is to ensure the money spent at their campus (or faculty or department) follows the standard rules and regulations.

Table 3

The users and preparers designations

No.	Types of Stakeholders		Designations
1.	Users	Head of unit	<ul style="list-style-type: none"> • Assistant Registrars (Student Affairs, Academics Affairs etc). • Head of Units. • Security Officers.
		Programs Coordinator	<ul style="list-style-type: none"> • Programme Coordinators (Diploma and Degree Programme). • Student Accommodation staff Head of Programmes (Diploma and Degree program).
2.	Preparers	Administration & Finance	<ul style="list-style-type: none"> • Head of Finance (Account Management) • Engineer / Head of Facility Department • Head of IT Department.
		Top Management	<ul style="list-style-type: none"> • Dean of the Faculty. • Deputy Dean of the Faculty. • Campus Directors. • Deputy Directors (Academic Affairs). • Deputy Directors (Student Affairs)

Source: Outlined by Jarrar et al. (2007): Users and preparers designations

Methodology

Sample

The sampling frame for the present study is UNIKL Business School. The study focuses on the finance department of UNIKL Business School which consists of the users and the preparers of the ABC system. The sampling procedure utilized for the present study was based on

disproportionate stratified random sampling. This sampling method refers to a situation where the population has been stratified in some meaningful way (Sekaran, 2003). Although using a convenient sample of experts may limit the findings' generalizability, it is the only practical sampling strategy for obtaining the information needed from very specific people who alone have the necessary facts and can provide the necessary information.

For the context of the current study, disproportionate stratified random sampling is thought to be the most appropriate method. This sampling technique is appropriate when there may be more variability within a particular stratum or when some strata are either too small or too large. When it is simpler, cheaper, and easier to collect data from one or more strata than from others, disproportionate sampling may also be used. As such, this sampling method involved stratifying the elements along meaningful levels and taking proportionate or disproportionate samples from the strata. This sampling design is more efficient than the simple random sampling design because, for the same sample size, each important segment of the population is better represented hence allowing for more valuable and differentiated information to be obtained for each group.

Data Analysis

The Survey Instruments

The surveys have been developed and designed to be easy to read and as easy to understand as possible. Since there is a lack of research directly related to this setting or available tools specifically designed to collect the required data, the questionnaire in this study was personally developed. A survey begins with an introductory section that briefly describes the purpose of the survey, outlines the questions, and provides general instructions. Respondents were assured of the confidentiality of their information.

The survey questions were closed-ended (except for one question) using a five-point Likert scale. The questionnaire is divided into two main sections. The questionnaire was piloted on a sample of 30 individuals to get some responses on consistency and reliability (words, sentences, etc.). A few changes were made to the questionnaire format, consistent application, and grouping of Likert scale questions within one section. A few questions were reworded to allow for more specific interpretation, notably regarding the possibility of cost distortion, decision usefulness, and the financial commitment to technology as well as the perceived value of ABC information. Instructions to respondents highlighted the importance of answering survey questions from the point of view of their function and role in the organization.

Tests of Statistical Significance

Data obtained from the survey instrument were tabulated and analyzed using the SPSS 28.0 for Windows statistical package. It is important to note that tests of statistical significance inference statistics are technically only suitable for truly random samples. It describes the many ways in which statistics derived from observations on samples from study populations can be used to deduce whether those populations are truly different. Therefore, inference statistics should generally only be used on randomly drawn samples from specific populations or, in the case of experiments, on samples randomly assigned to different treatment and control conditions (Gall et al., 1996).

Tests of statistical significance, including correlational analysis, may be questionable for non-random or convenience samples "if the sample is carefully conceptualized to represent a

particular population” (Gall et al., 1996: 229). Based upon the discussion of the sample drawn for this research, the use of inferential statistics for the present study appears to be warranted. Eight statistical analyses were used in the present study, namely (i) Normality test, (ii) Skewness and Kurtosis, (iii) Descriptive Statistics, (iv) Correlation, (v) ANOVA, (vi) Reliability Analysis, (vii) Factor Analysis, and

Proposed Research Framework

The idea for the conceptual framework comes from the diffusion of innovation theory (IDT) by (Rogers, 2003). ABC adoption can be based on a variety of theories, including but not limited to contingency theory Al-Omiri (2012); Brierley (2009); Rankin (2016), diffusion innovation, strategic management theory (Gosselin, 1997; Baird et al., 2004). Theories can be used on their own or in conjunction with others, such as Rankin (2016) which combines innovation theory with strategic management, or the research conducted by Al-omiri (2003) and Aldukhil (2012) which combines the contingency theory with diffusion innovation. No matter what the theoretical approach is, the factors that influence ABC adoption include technical, behavioral, and organizational factors.

The conception framework for this study is most focused on persuasion which consists of perceived characteristics of innovation. Rogers (2003) described the innovation-diffusion process as an uncertainty reduction process, and he proposes attributes of innovations that help to decrease uncertainty about the innovation. Perceived characteristics of innovations include five characteristics of innovations: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Furthermore, Rogers (2003) stated that individuals’ perceptions of these characteristics predict the rate of adoption of innovations. Also, Rogers noted that although there is a lot of diffusion research on the characteristics of the adopter categories, there is a lack of research on the effects of the perceived characteristics of innovations on the rate of adoption. Along with that, because of the lack of study done on the perceived characteristics of innovation and not many studies focus on HEI, this study will focus on the adoption of ABC (focusing on perceived characteristics of innovation) in higher educational institutions. The conceptual framework developed as follows:

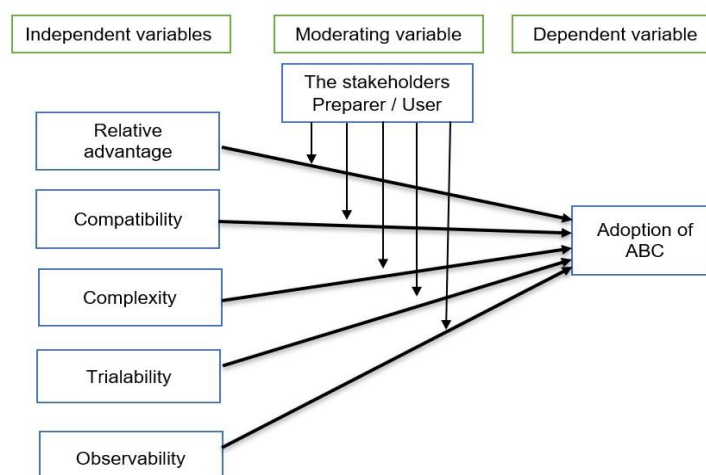


Figure 2: Proposed Research Framework

According to Askary et al (2012), the relative advantage of an innovation can be explained as the degree to which an innovation seems to be better than the method it is supposed to replace. Meanwhile, compatibility refers to the degree of consistency of innovation with the needs, expected values, and norms of potential adopters and their social systems (Rogers, 2003). Complexity refers to the ease of use is the extent to which an innovation can be used with little effort (Davis et al., 1989). Result demonstrability relates to the tangibility of using the innovation and includes the observability and communicability of the results of using an innovation. Furthermore, trialability is the degree to which an innovation can be tried on a limited basis before full implementation. This reduces the risk and uncertainty of the consequences of using the innovation (Karahanna et al., 1999). The last one is observability. Observability is the degree to which the results of an innovation are visible to others. The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it (Askary et al., 2012). Image is the degree to which using an innovation enhances the user's image or status and voluntariness of use is the extent to which the use of an innovation is regarded as voluntary. The research model presented above summarizes the hypotheses on factors affecting ABC adoption in higher education institutions in Malaysia.

Research Objective

In addition to these questions, this study will explore the HEI's role in ABC adoption by building the research objectives using innovation diffusion theory (IDT). In examining the factors that influence the adoption of innovations, innovation diffusion theory (IDT) suggests that characteristics of innovations such as relative advantage, compatibility, complexity, observability, and trialability influence the rate of adoption of ABC (Rogers, 2003).

Research Questions

From the related research objective, the research questions developments as follows:

RO1: Is there is relationship between relative advantages with the adoption of ABC.

RO1a: Is the user/preparer will moderate the relationship between relative advantage and adoption of ABC.

RO2: Is there are relationship between compatibility with adoption of ABC.

RO2a: Is the users/preparer will moderate the relationship between compatibility and adoption of ABC.

RO3: Is there are relationship between complexity with adoption of ABC.

RO3a: Is the user/preparer will moderate the relationship between complexity and adoption of ABC.

RO4: Is there are relationship between trialability with adoption of ABC.

RO4a: Is the user/preparer will moderate the relationship between trialability and adoption of ABC.

RO5: Is there are relationship between observability with adoption of ABC.

RO5a: Is the user/preparer will moderate the relationship between observability and adoption of ABC.

Hypotheses

Based on Rogers' Innovation Diffusion Theory, five perceived characteristics of innovation will lead organizations to adopt the innovation of ABC. Therefore, based on the conceptual foundation provided by Rogers (1995) and from past research, the following hypotheses will develop:

H1: Relative advantage is positively related to adoption of ABC.

H1a: The user/preparer will moderate the relationship between relative advantage and adoption of ABC.

H2: Compatibility is positively related to adoption of ABC.

H2a: The user/preparer will moderate the relationship between compatibility and adoption of ABC.

H3: Complexity is negatively related to adoption of ABC.

H3a: The user/preparer will moderate the relationship between complexity and adoption of ABC.

H4: Trialability is positively related to adoption of ABC.

H4a: The user/preparer will moderate the relationship between trialability and adoption of ABC.

H5: Observability is positively related to adoption of ABC.

H5a: The user/preparer will moderate the relationship between observability and adoption of ABC.

Measurement of Variables

Dependent Variable

The dependent variable focuses on the acceptance of the adoption of ABC. This variable will be measured by the questionnaires to the respondents. The respondents will be asked to answer the question regarding ABC adoption in their university. The ABC adoption was obtained from a single question with responses of current ABC adoption such as adoption of ABC or non-adoption of ABC (Huong et al., 2020). For the binary regression analysis, a response with ABC adoption is coded as '1' and a response with non-adoption is coded as '0'.

Independent Variable

Perceived characteristics of innovations will be measured based on the previous studies. The items for this scale were derived from previous diffusion research. Before writing items, instruments were collected from Jamaluddin (2015); Askary et al (2007); Zulkifli (2001); Steckler (1992); Brink (1995); Moore and Benbasat (1991) as they contained examples of how the five perceived attributes (relative advantage, compatibility, complexity, observability, and trialability) of an innovation could be operationalized.

They were written using a Likert scale that ranged from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree' and were intended to include at least two items for each attribute. Besides that, the measurement scales are based on original studies Gosselin (1997); Krumwiede (1998); Al-Omiri & Drury (2007); Brierley (2009); Aldukhil (2012); Jamaluddin (2015); Rankin (2016); Nguyen (2020); Nguyen (2020); Pham et al (2020) and developed by the researcher.

The relative advantage will be measured by asking respondents about their perception towards ABC, whether ABC will reduce the company's overall operating cost, whether the adoption will increase the accurateness of the data recorded and help the company to get the accurate information, whether the information produce by the system was greater details, whether information produced by the system is easy to access by all the department units, and whether the level of reliability of the information produced by this system is very high (Nguyen, 2020; Nguyen, 2020; Pham et al., 2020).

Compatibility. This construct was measured by asking respondents about their perception of ABC on whether ABC is compatible with the company's traditional operating procedures, with the company's current operations/processes, and with the existing values and mentality of the people in the company. What the innovation is called should be meaningful to the potential adopter. What the innovation means also should be clear. This is part of the complexity attribute (McKenzie, 2001; Hoerup, 2001; Sherry, 1997).

Complexity. To measure this construct, the respondents were asked whether it is difficult to understand the new system, whether the new system is easy to use, whether the system will give accurate information needed for the decision making purpose, whether people in the company lack the necessary knowledge and understanding related to ABC and require a lot of training to start using the new system, and whether the company lacks the technical knowledge to install the new hardware/software needed for ABC. If hardware and software are user-friendly, then they might be adopted successfully for the delivery of course materials (Martin, 2003).

Trialability. This construct was measured by asking respondents whether they could access a free trial before deciding to adopt ABC, whether the company has the opportunity to try to use the pilot test of the system before deciding to adopt the innovation, and whether the startup cost of using the ABC system is low. For the adoption of an innovation, another important factor is the vicarious trial, which is especially helpful for later adopters. However, Rogers (2003) stated that earlier adopters see the trialability attribute of innovations as more important than later adopters.

Observability. This construct was measured by asking respondents whether it shows improved results over doing business the traditional way, whether many private companies in Malaysia started to adopt the innovation, and whether the adoption of ABC helps the company to improve the decision-making process. Role modeling (or peer observation) is the key motivational factor in the adoption and diffusion of technology (Parisot, 1997).

Moderating Variables

The present study adopted the guidelines as outlined by Jarrar et al (2007) to classify two stakeholders of the HEI as can be seen in the Table below. This means that the users can also be considered as preparers but they are not the persons that need to justify the amount during budget preparation. Their main duty is to ensure the money spent at their campus (or faculty or department) follows the standard rules and regulations. The preparers encompass a group of people that represent the management's point of view, as they are keen to ask a question like, "What a product should have cost". While users encompass those with the popular question "What did it cost". Managers are constantly comparing their product cost with "what it should have costed".

Contribution of The Study

This study provides significant insights into the application of Activity-Based Costing (ABC) in the higher education sector. It highlights the advantages of using ABC in a university setting, such as enhanced accuracy in cost information, which supports better resource allocation and financial decision-making. This is particularly important in private universities

where financial efficiency is crucial for sustainability and growth (Rankin, 2016; Nguyen, 2020; Nguyen, 2020; Pham et al., 2020)

Furthermore, the study identifies several critical success factors for the effective implementation of ABC. These include strong support from top management, the simplification of the ABC process, the selection of appropriate software, and comprehensive training programs to ensure that all employees understand and support the new system. These factors are essential in overcoming the typical challenges faced during ABC implementation, such as resistance to change and the perceived complexity of the system (Duron, 2001; Evans, 2004; Granof et al., 2000).

In addition to documenting these success factors, the research also explores the barriers that hinder the adoption of ABC, such as a lack of expertise and resources, which are common issues across different sectors. By comparing the experiences of Universiti Kuala Lumpur with other sectors, the study provides a broader perspective that can help other educational institutions benchmark their progress and develop strategies to address similar challenges. This comparative analysis offers valuable implications for policymakers and university administrators, helping them make informed decisions to enhance the financial stability and educational outcomes of their institutions (Nguyen, 2020; Nguyen, 2020; Pham et al., 2020).

Conclusion

This study mainly focuses on the relationship between perceived characteristics of innovation and the adoption of ABC. Therefore, the scope of this study is to study only the perceived characteristics of innovation. From this study, the expected result might be generated by referring to the correlational analysis and multiple regression analysis. It shows that Rogers' perceived characteristics of innovation – relative advantage, compatibility, and observability – were useful predictors. Compatibility and relative advantage are the factors that primarily influence the adoption of ABC. Complexity and trialability are adverse relationships with the adoption of ABC. This result will be consistent with the study done by (Nguyen, 2020; Nguyen, 2020; Pham et al., 2020; Jamaluddin, 2015; Martin, 2003; McKenzie, 2001; Hoerup, 2001; Sherry, 1997).

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