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User Acceptance Evaluation Of Web-Based Spin Application Using The *Empirical Test-Based* Tam Approach

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Abstract

The purpose of this study was to assess the level of user acceptance of the web-based Internal Control System (SPIN) using the Empirical Test-Based Technology Acceptance Model (TAM) approach via the User Acceptance Testing (UAT) procedure. For achieving the purpose of the study, data was gathered from the UAT outcome of 40 test cases in the four major modules: login function, master data function, approval function, and reporting function. The outcome demonstrated 100% success rate PASS in all the modules. The application of the study minimizes the limitations associated with the traditional TAM by incorporating facts from carrying out system testing exercises through the Empirical Test-Based TAM approach based on the UAT procedure. The study also expands the TAM theoretical framework from the 'perception construct level' to the construct level of facts pertaining to behaviors of the users based on the UAT procedure result.

Keywords: SPIN, UAT, Empirical TAM, User Acceptance, Information System

INTRODUCTION

The enhancement of the information technology implementation of the Internal Control System (SPIN) is also a requirement for the transformation of corporate governance for the improvement of business process effectiveness, reporting integrity, and consistency with Good Corporate Governance (GCG) practices. The current framework of COSO on Internal Control over Sustainability Reporting (ICSR) has a relevant framework for Internal Control Integrated Framework (ICIF) that could primarily be utilized for the establishment of internal controls for different forms of information such as integrated digital reporting.(Committee of Sponsoring Organizations of the Treadway Commission, 2023).

A strategic activity of Web-Based Internal Control System (SPIN) design aims at optimizing methods of control data, processes, and evidence of reporting within an

ecosystem. SPIN is more about developing a whole new application. In this regard, SPIN makes data integration easier among different units, reduces dependence on manually follow-through processes, and enables error-correcting capabilities through more reliable data sources. These variables are all encompassed by the basic tenets of governance digitization, namely quick processes, optimal control, and decision-making based on factual information.

On the other hand, SPIN is also an operational engine that assists with each and every step of Internal Control over Financial Reporting. Right from planning and determination of scope, determination of risk of reporting, development of risk & control matrix(RCM), design and completion of control process and its efficacy testing to further monitoring actions related to findings of completion of control process, each and every step can now be accomplished under a well-defined and unmissable workflow.

SPIN is also able to link functional roles and activities without any overlaps. In relation to the three-line model above, SPIN could therefore act:

- The first line (the owners of business processes) always deliver and show their controls,
- The second line (risk and compliance function) oversees, guides, and verifies that control standards are consistently applied,
- The third line is comprised of internal audit. It performs its assessments in an independent manner based on data or evidence.

In this way, the three lines can act together, from planning, implementation, evaluation, and feedback. They are all integrated, measurable, and have accountability from the upstream line all the way down to the downstream line. Nevertheless, for a successful digitization of internal control system usage, it is crucial that it relies upon system architecture capabilities and acceptance by users. As indicated in a number of literature reviews and meta-analyses cited in recent literature, many digitization-based projects have not been successful in creating value because of a lack of acceptance and ease of use by users, even though it is considered functionally sufficient. (Marikyan et al., 2023; Du et al., 2024). Results and Discussion These findings underscore that the design and evaluation of information systems have to take into account not only functionality and compliance aspects but also behavioral aspects.

Technology Acceptance Model (TAM) is still very popular when it comes to explaining the acceptance and usage of information systems. Based on a review of recent literature, it is revealed that two constructs that form an integral basis of the Technology Acceptance Model are named as perceived usefulness (PU) and perceived ease of use (PEOU). These constructs always come forward as prominent predictors of use of technology.(Marikyan et al., 2023; Du et al., 2024). Further analytical work highlights the fact that despite the introduction of additional variables related to the social, organizational, and psychological fields, most of the progress in the development of the advanced models

like UTAUT, TAM2, and TAM3 is still based around these two core concepts. (Du et al., 2024). For that reason, TAM is still relevant to be used as a conceptual basis in investigating user acceptance of SPIN. Whereas conceptually sound, most traditional TAM studies nonetheless rely on perception questionnaires, which prevents them from exploring real use of TAM in the field.

Only lately has literature started using behavior-based measures, such as activity log data, frequency of use for features, and quantifiable system performance indicators. (Wang et al., 2025) These methods thereby relate constructs such as PU and PEOU with evidence of real user behavior and are, therefore, more compatible with falsifiability and empirical testing principles in information systems research. This paper henceforth proposes an Empirical Test-Based TAM method that merges the TAM framework with system testing results conducted through User Attention Testing.

THEORETICAL BASIS AND MODEL DEVELOPMENT

Technology Acceptance Model (TAM)

"User's intention to use the technology," according to TAM, is directly determined by Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness is a measure by which users judge their system's ability to enhance work performance and effectiveness, while Perceived Ease of Use "is a measure by which users judge an application's ease of use and learnability without requiring high cognitive effort." Many systematic and meta-analytic studies have recently verified that Perceived Usefulness and Perceived Ease of Use remain effective factors in determining user intention and behavior concerning many information system applications, including online platforms, online services, or business applications (Marikyan et al., 2023; Du et al., 2024). Moreover, inter-framework comparison studies of research on TAM and UTAUT endorse that PU and PEOU are the key factors in understanding technology acceptance, with others acting as context extensions.(Lee et al., 2025;Yang et al., 2025; Xue et al., 2024)

From Perception to Behavioral Evidence

In conventional TAM research, questionnaires are utilized primarily for measuring the perception of system advantages by users. This method is helpful during the exploratory phase, but has limitations when organizations need more robust evidence of how the system works. The introduction of cognitive variables such as PU and PEOU in relationship to task accomplishment success, usage intensity of the learning management system modules, or other indicators of system performance indicates the progressive integration of cognitive

variables with empirical data of actual system usage behaviors of individuals (Hassler et al., 2021). (Wang et al., 2025) developed a TAM-based instrument measuring user experience that was directly validated by system-use behavior, proving that an empirical method can improve theory testing and offer a sounder basis for IT management and auditors.

Empirical Test Based TAM Framework

The five methodological stages constitute the empirical test-based TAM framework in this study. The first is the specification of theoretical aspects (PU and PEOU), the second is the design of observable test indicators, the third is the implementation of UAT by actual users, the fourth is the aggregation and categorization of test results, and the fifth is evidence-based theoretical inference. This method aligns with emerging perspectives in design science research (DSR), which emphasize the importance of a clear connection between theory, system artifacts, and replicable empirical evidence. (Iivari, 2020; Gregor & Zwikael, 2024). This study positions SPIN as a design component that can be evaluated in terms of functionality and validation of user acceptance behavior by translating the TAM structure into measurable *test cases* .

RESEARCH METHODS

To implement SPIN, this study uses a descriptive case study approach that combines the logic of design scientific research (DSR) and case study guidelines in software engineering. According to DSR, SPIN is considered an artifact designed and evaluated through a *build-evaluate cycle* to produce scientific contributions and practical benefits for the organization (Iivari, 2020. Gregor & Zwikael, 2024)The choice of units of analysis consisting of four main modules (login and authentication, master data, approval, and reporting) follows the principles of case studies in software engineering, which emphasize clarity of context, units of observation, and systematic reporting of results (Wohlin, 2012, 2021; Wohlin & Rainer, 2022).

Research Design

This study aims to evaluate and confirm how user behavior in UAT correlates with theoretical elements of technology acceptance, such as *perceived usefulness* (PU) and *perceived ease of use* (PEOU).

Research Procedures

The analysis is conducted through five main stages within the *Empirical Test Based* TAM framework:

- Theoretical Aspect Specifications, namely determining PU and PEOU as theoretical aspects of technology acceptance.
- Test Indicator Design, namely translating theoretical aspects into *test cases* that can be tested empirically.
- Implementation of UAT by Users, involving actual SPIN users to test the function, convenience and benefits of the system.
- Mapping the empirical fit between UAT results and theoretical aspects of TAM.
- Empirical evaluation of the TAM model based on UAT results, namely assessing the suitability of the empirical results with TAM theory. This stage allows triangulation between empirical data, user behavior theory, and the actual experiences of system users.

Units of analysis and data

The focus of this research analysis unit is the four main SPIN modules that form the basis of the web-based internal control workflow: login and authentication, master data, approval, and reporting. These four modules represent the end-to-end processes, from user access control, to the creation and maintenance of reference data, to the approval mechanism as a control point, and to the final output of monitored information and reports for decision-making and monitoring.

Furthermore, the research's empirical data comes from forty User Acceptance Test (UAT) results, conducted directly by the system's end users. These tests, which are:user-facing not only show the system's features in action but also how it is used-whether the SPIN flow is clear enough, whether the controls work well, and whether the output it generates is truly helpful. Supporting all these findings are notes recorded during the testing process to support the UAT data. This implies that the research is not only based on the results of passing or failing test case results but also includes context about the event, obstacles faced, recurring error patterns, and user responses while making use of key SPIN features.

Through a combination of 40 UAT test cases with observations in the field during the testing, this study has sufficient grounding to conduct a review of the performance of modules in SPIN, not only from a technical perspective but also from a usability perspective, control consistency, and contributions to reporting accuracy and effective internal control monitoring.

Analysis Techniques

Descriptive analysis in this study combines quantitative and qualitative data in such a way that the resultant picture shows not only whether the system is up or down but also how the system is perceived by its users.

On the quantitative side, data calculation gives the UAT success rate through the PASS/FAIL ratio across every test case. Such a calculation would distinctly point out, in objective terms, how well the system's functionality is meeting the agreed-upon test scenarios and helps in pinning down those modules or stages where most failures are occurring.

While on the qualitative side, data is used to determine user perceptions of the system, especially on ease of use and in supporting work. This is important, because a system that has been tested from a technical point of view might not turn out to perform well in the field, if users find the process confusing and too step-by-step, or does not add value. By combining the two, analysis results become more comprehensive, not just assessing system performance but also assessing system readiness for adoption and consistent use.

To test the empirical findings' alignment with the Technology Acceptance Model (TAM) theory, two types of outcomes—UAT success rates (PASS/FAIL) and qualitative findings from user experiences—were not left alone. They were then systematically mapped to the two main elements of TAM: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). This means the study not only asked, "Do you find this system useful and easy?" but also linked that answer to concrete evidence from user-executed test scenarios.

Through this mapping, user acceptance evaluation becomes more verifiable because it is supported by user perceptions and test results. If users find the system easy, this can be traced to low *error rates in certain flows, smooth test case* completion , or minimal need for assistance during UAT. Conversely, if users perceive high usability, indicators are visible in the success of functions that directly support work, such as data consistency, accelerated *approvals* , or better-quality reporting output.

This approach was then formulated as *the Empirical Test Based* TAM Model, which is the development of TAM application that does not stop at the cognitive framework (what users think), but also enters the realm of action-based validation (what users actually do when interacting with the system). In this way, TAM is not only a tool for reading attitudes, but also a relevant model for the context of applied information systems and technology-based audits, because it is able to show a more real relationship between system design, user experience, and the level of success of system use in practice.

DISCUSSION RESULTS

Theoretical Aspect Specifications

In the initial stages, the Technology Acceptance Model (TAM) framework was used as a foundation to break down the concept of user acceptance into more measurable aspects relevant to the research context. In this study, the main emphasis of the research work was pointed at two critical parts of the TAM variables: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness (PU), this refers to the user's belief that the system does indeed add value to them, for instance, assisting them in working better and faster. In simple terms, it responds to the following question: Does this system make my work better?

Perceived Ease of Use (PEOU), on the other hand, is users' perception that the system is easy to understand and use, and not places too great a demand on them in terms of energy, that is, users' view that it is not energy-consuming to comprehend or operate. Perceived Ease of Use focuses on the experience users have when dealing with the system, whether it's effortless, not confusing, nor requiring too much support in order to be able to use it, that is, whether it's easy-to-use or whether it's a hassle.

In relation to SPIN application, theoretically, Perceived Usefulness (PU) is viewed as "the degree to which an individual believes one system is superior to another one in some sense"—this is how it applies to PU's theoretical construct. In this case, PU's theoretical construct can be viewed in relation to SPIN's capacity to expedite, such as by shortening waiting times, providing statuses, and eliminating back-and-forth corrections. PU further enhances error-free reporting in terms of consistency, completeness, and readiness of reports for monitoring.

On the other hand, the theoretical construct of Perceived Ease of Use (PEOU) is concerned with the user experience during the usage of the system from day to day. Ease of use in the SPIN system is the ease of login (quick login without hassles), the ease of navigation of the interface in the system (menus easily accessible, uncluttered work processes), and the integrity of the input process in the system (smooth inputs without errors in the system responses, where the data is stored as desired). Therefore, Ease of use is not only about how it looks but also about “being easy to use.”

Test indicator design

The second phase focuses on designing test indicators that bridge theoretical concepts with empirical evidence in the field. At this stage, each *test case* in the UAT is not created simply to test a feature, but rather is designed with a clear objective: to measure aspects of user acceptance based on the TAM, namely PU and PEOU. This way, UAT results can be

directly interpreted as evidence of whether the system is truly useful and easy to use, not just technically functional.

Operationally, the mapping of test indicators is carried out as follows: Test cases in the approval and reporting modules are directed to measure Perceived Usefulness (PU), because these two modules are directly related to the benefits most felt by users such as accelerated approval flows, clarity of process status, and accuracy and readiness of reporting output. If the test scenarios in these two modules run smoothly and meet expectations, then this is a strong signal that SPIN provides real added value to work performance and efficiency.

In contrast, test cases in the login and master data modules are aimed at measuring *Perceived Ease of Use* (PEOU), as this area most determines the initial experience and smoothness of daily use. Easy login, clear navigation, and stable master data input are important indicators of whether the system can be operated effortlessly, without confusion, and without recurring technical obstacles. In other words, this module tests whether SPIN is user-friendly and ready for consistent operational use.

With this design, each PASS/FAIL result does not stand alone, but rather has a meaning that indicates which users are strong, and which areas still need improvement to make system adoption run more smoothly. This indicator design follows the principle of *construct operationalization* , namely the translation of theoretical concepts into testable variables. (Riti et al., 2025; De Benedictis et al., 2021; Li et al., 2025; Reddy et al., 2023; Rizal et al., 2025). Thus, each system test result will represent empirical validation of one dimension of TAM theory.

UAT Implementation by Users

In the third stage, the four main modules of the SPIN application login and authentication, master data, approval, and reporting were tested with forty test cases.

Testing was conducted live and only given to potential operational users who had a basic understanding of SPIN's business processes. The following table shows how the development team viewed each test scenario live before Go-Live:

Table 1. SPIN Application UAT Results

Module	Number of Test Cases	PASS	Percentage	Note
Login and Authentication	5	5	100%	Credential validation successful
Master Data	10	10	100%	Data input and update successful

Approval	15	15	100%	Smooth approval process
Reporting	10	10	100%	Accurate and complete reports
Total	**40**	**40**	**100%**	**All modules are accepted by users**

Source: SPIN Application UAT Data (2025)

Of the 40 UAT test cases executed on SPIN's four main modules, all resulted in a PASS (100%) status. This is a strong signal that, in the tested usage scenarios, SPIN is ready for operational use, with its workflow running, its core functions working, and its output meeting user expectations.

- Login & Authentication (5/5 PASS | 100%)
  Basic access control is effective, authentication is successful, and users are successfully able to log in without too much trouble. This is because it's important in the PEOU model that users are not immediately disinterested in using a system because of difficulty in logging into that system.
- Master Data (10/10 PASS | 100%)
  The data entry and update procedure flowed well. The master data serves as the focal reference base in SPIN. Any errors in this data might have had the potential to affect the correctness of subsequent processes, especially in the approval and reporting modules.
- Approval (15/15 PASS | 100%)
  The approval flow runs smoothly. This module always remains the most critical because it deals with approval, status, and accountability. The 100% outcome entirely puts focus on the PU side because it proves that it really helps in the faster approval process and makes it all clear.
- Reporting (10/10 PASS | 100%)

Reports are correct and complete. This is output control's primary goal, and is not restricted to the finished report, but sometimes for monitoring and decision purposes. All test cases obtained PASS status during the testing process.

Table 2. Functional Performance Categories of SPIN applications based on UAT results

Testing Aspects	Empirical Results of UAT	Performance Category
User Authentication	All logins were successful without any issues.	Very good
Input & Update Data	All data is stored validly and validated automatically.	Very good
Document Approval	The approval flow runs automatically and according to the hierarchy.	Very good
System Reporting	Complete report, format according to PLN standards	Very good

This stage provides a strong empirical basis for analyzing the fit between theory and data, as observations indicate that every functional aspect of the SPIN system, with a 100% test success rate, received a "very good" rating. These results indicate that users strongly favored the system in terms of usefulness and ease of use. This aligns with the key theoretical aspects of the TAM model.

Mapping the empirical fit between UAT results and theoretical aspects of TAM

The fourth stage is comparing the test results with the established theoretical dimensions. Of the 40 tests, 22 included the theoretical aspects of PU and 18 included the theoretical aspects of PEOU. Each test received an overall PASS score, indicating no rejections or obstacles to the system.

The results of the empirical fit mapping between the UAT results and the theoretical elements of TAM are depicted in the following table:

Table 3. UAT results and theoretical aspects of TAM

Theoretical aspects of TAM	Number of Test Cases	PASS	Percentage	Information
Perceived Usefulness (PU)	22	22	100%	The system improves the efficiency, accuracy and transparency of reports.
Perceived Ease of Use (PEOU)	18	18	100%	Easy to use interface, stable login and data input

Total	**40**	**40**	**100%**	**All theoretical aspects are empirically verified**

The table above shows that the user acceptance evaluation in SPIN does not stop at assessing functional features, but is directed to test two main dimensions of technology acceptance, namely *Perceived Usefulness* (PU) and *Perceived Ease of Use* (PEOU). At this stage, each UAT test case is first classified based on its testing objectives; scenarios that assess the benefits and output of the system's work are mapped to PU, while scenarios that assess ease of interaction and smoothness of use are mapped to PEOU. With this design, the PASS/FAIL status not only represents technical pass but also becomes an empirical indicator that can be linked directly to the theoretical construct of TAM.

Based on the table, the PU construct included 22 test cases, all of which were declared PASS (100%). These findings suggest that for the given situations, SPIN did deliver useful work benefits for their users with regard to process efficiency, accuracy of results, and transparency of results reporting. At this operational level, these benefits were realized through the good process flow of this module which provided a direct benefit for users through a good approval process flow of documents, good status of documents at any given time during processing with good status information provided, and accurate and timely results reporting." Thus, the results based on PU construct further reinforce this notion that SPIN is rather useful for making processes and their outputs better as it is aimed.

Moreover, in addition to having 18 items for test cases, the PEOU construct also achieved a 100% PASS. These results make it clear that SPIN is very easy to use in terms of usability in critical points which are common sources of friction during usage, such as ease of login procedures, interface navigation facilities, and data input process. In practical terms, data input stability and ease of access are considered basic necessities of usage by operational users so as not to be interrupted by recurring mistakes, confused procedures, or doubts regarding whether data is properly saved. Thus, from the PEOU result, it is clear that SPIN is designed to be sufficiently user-friendly in terms of usage procedures during the carried out tests.

Empirical evaluation of the TAM model based on UAT results

In the final stage, it was revealed that, based on the results of the UAT, two factors significantly influence the acceptance of SPIN among users:

- actual system benefits (empirical PU): users perceive system benefits in performance and/or reporting efficiency;
- Ease of use (empirical PEOU): Users find it easy to operate the system.

This finding is consistent with a theory proposed by Davis (1989), and it is supported by the emergence of TAM2. (Davis & Granić, 2024), which proposed that perceived use convenience and perceived use value are direct factors in influencing system use behavior.

CONCLUSION AND IMPLICATIONS

Conclusion

In the current study, the Empirical Test-Based Technology Acceptance Model (TAM) approach was employed for the evaluation of user acceptance of the web-based Internal Control System (SPIN) application for the purpose of analysis and testing. UAT stands for user acceptance test. Each of the forty test cases from the four key modules has obtained the 100% PASS result. This particular analysis and testing disclose that the overall user acceptance for the SPIN system is obtained when it refers to its relative use value and user-friendly nature as well. From the theoretical point of view, the extension of the Technology Acceptance Model within the context of the web-based internal control informational system is demonstrated within the current study.

Theoretical Implications

Theoretically, the contribution of the findings of this study to the improvement of TAM consists of illustrating that the indicators of PU and PEOU can be measured not only using perception surveys, but can be approached through the use of empirical indicators generated during the UAT phase of the system implementation process, reflecting the trend of aligning acceptance of technology models with data regarding their use, implying that testing theories needs to be more closely aligned with practice. (Li et al., 2025; Wang et al., 2025). In relation to a DSR perspective, from the Empirical Test-Based TAM model employed within this research, theory can be adapted for the construction of evaluation procedures that can be recalculated within different Internal Control System (SPIN) situations (Gregor & Zwikael, 2024; Iivari, 2020). This fits with the notion that scientific statements must be rooted in actual, repeatable testing processes, and not merely conceptual reasoning.

Practical Implications

The implication of this research can be applied directly to three important parties: system developers, auditors, and management, because the results obtained not only encompass running features, but also the level of trust, usability, and actual use for which the system was developed. Regarding system developers, the results obtained in the UAT through the TAM model can help in having a more rigorous instrument to assess design

validity. Linkages between test cases and their equivalents in the battery of constructs for PU and PEOU can assist the system developer in understanding not only the points of failure in the system but also the reasons for which users may consider a process advantageous versus a nuisance.

The above empirical approach now gives the auditors more substantial evidence on the user acceptance to substantiate the assessments made on IT control effectiveness. If an internal control system is digitized but not fully adopted, then the controls risk being strong in design but weak in implementation. For the auditors, UAT evidence and user observations are an objective basis for assessing the consistency with which IT controls are operating, including any error-prone areas, and the extent to which the system is sufficiently reliable to support internal control and reporting.

The research findings give management confidence that SPIN implementation is not only technically effective but also behaviorally accepted by operational users. This is so critical, as the success of governance digitalization is not decided by whether the application is available but by the actual level of adoption and disciplined use in the field. Using evidence that users are able to perform the process well (UAT) and find the system helpful, easy to use (PU/PEOU), management is reassured with a strong signal that SPIN is ready for a governance strengthening instrument, and not just an IT project.

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