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Effectiveness of an Innovative Ict Transaction Processing System with Data Analytics

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ABSTRACT
Learning from transaction systems, along with additional application system examples, is an effective method for developing software applications such as the Transaction Processing System. This study aimed to assess the effectiveness of an innovative ICT transaction processing system with data analytics by evaluating the developed system, identifying which rating is most significant when grouped by respondent type, and determining the extent to which the system is preferred over conventional methods in terms of speed and accuracy.
The study involved 43 participants from various offices and colleges of MSU-Maguindanao, categorized into three groups: administration and faculty, staff, and students. A survey questionnaire was distributed to gather the necessary data. The overall verbal rating was "Agree" across multiple aspects, with mean scores as follows: system quality (4.34), information quality (4.32), ease of use (4.25), usefulness (4.25), and acceptance (4.32).
The findings indicate that system quality and information quality showed a significant difference in perception among the groups regarding effectiveness. Meanwhile, ease of use, usefulness, and acceptance were also rated as significant, but no significant difference in perception was found among the groups. Ultimately, the results support rejecting the null hypothesis, suggesting that there is a significant difference in perception among respondents regarding the system's effectiveness in terms of speed and accuracy.
Thus, the study concludes that the innovative ICT transaction processing system with data analytics is effective.

Keywords: transaction processing system, data analytics

I. INTRODUCTION

In today's digital age, most transaction systems depend on modern technological innovations, including mobile phones, computers, the Internet, and more. In this context, the transaction processing system serves as the backbone of all transactions across businesses, public and private organizations, government agencies, and academic institutions (Kwadade-Cudjoe, 2020).

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A transaction processing system is essential for managing the daily financial operations of businesses. In both private and public organizations, the transaction processing system ensures that transactions are processed accurately and efficiently, allowing these organizations to operate smoothly and deliver services effectively. Additionally, government agencies can leverage a transaction processing system to enhance service delivery to citizens, improve operational efficiency, and ensure accurate and secure data. Furthermore, the transaction processing system plays a crucial role in academic institutions by streamlining various administrative and operational tasks (Brooks, 2011).

Employees of institutions and organizations have the responsibility to enhance the transaction processing system to meet the demands of the digital world. To fulfil this role effectively, organizations integrate conventional networking infrastructures that support seamless data processing (Wahsheh, 2023).

Some of the major transaction processing systems include subsystems that are commonly found in most organizational firms. In larger organizations and institutions, where most operations are already computerized, these subsystems serve a variety of purposes (Mahar & Khuzdar, 2014).

The problem discussed the variety of sub-systems of a system, and software used to support transaction processing systems in businesses and organizations including “traditional network systems” that can support a certain level of network management system, “advanced systems” capable of supporting every level of management system, and “blockchain systems” focus on network system security (Tripathi et al., 2023).

On the other hand, it is essential to acknowledge that the transaction processing system operates at the operational level of an organization, facilitating real-time transaction processing and ensuring smooth business operations (Muslihah & Nastura, 2020). Additionally, while these transaction processing systems are believed to improve efficiency, they also introduce potential security risks and vulnerabilities that must be addressed to maintain system integrity (Wahsheh, 2023).

At Mindanao State University-Maguindanao, the Computer and Information Education Center (CIEC) conducts transactions such as servicing equipment and gadgets, managing networks, providing software and hardware support, developing software, and handling requests for technical assistance.

However, multiple transactions present several challenges, such as tracking the logs of equipment or gadgets in record books, noting network remarks, addressing software and hardware issues, monitoring the status of software development, and managing the queue for requests for technical assistance. Addressing these challenges is crucial for enhancing efficiency and effectiveness in ICT operations and for transitioning from manual processes to automation (Pilot, 2021).

Thus, developing an ICT Transaction Processing System with Data Analytics (TPSDA) has been initiated to enhance technical support operations. Furthermore, it will help the institution provide timely and high-quality assistance to users, resolve issues more efficiently, and maintain emotional intelligence in the client service experience.

II. METHODOLOGY

System Development Methodology

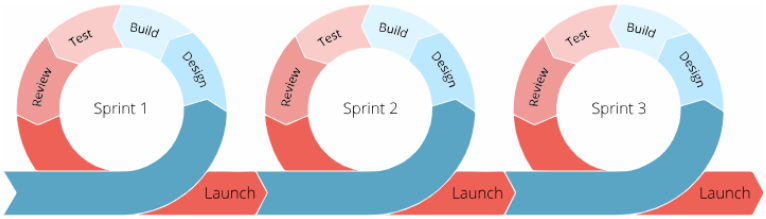

Figure 4. Agile Methodology of the Developed System

Figure 4 shows the application of the agile methodology in the development of the system. The concept of this method is to deliver output incrementally by incorporating user requirements and feedback in each iteration. Activities under this model include planning, design, building, testing, review, and launch.

The first phase is planning. All the requirements were identified, and various activities such as research, interviews, and observations were conducted to gather the necessary information for the study. The gathered data were analyzed to identify problems and propose possible solutions. The scope and boundaries of the system, as well as the software and hardware requirements, were also established.

This process includes the creation of the database design and user interface design. During this phase, the project was subdivided into several program modules to ensure that each project objective was implemented.

As indicated in Figure 3, particularly in designing the form, the first form is the home module and the "Home" menu. Under the home menu is a sub-menu that includes features for login/logout, changing the current user password, and exiting the application. Additionally, the home module contains the "Transaction" menu, which links to the transaction module. The transaction module allows users to input new requests, receive requests, add supporting images, and release finished or unfinished requests based on the remarks of the preparer or technician.

The home module also features the "Settings" menu, enabling users to create new accounts, update existing accounts, and view the log history of all user accounts. Moreover, the home module includes the "View" menu, which generates system transaction reports within a specified date range and displays graphical representations of transactions over time.

After multiple rounds of debugging, all modules are ready for use without errors. The accounts by levels 1 (end-user), 2 (Admin), and 3 (Programmer) can be accessed to open the system's modules, ensuring the security of the data information.

Research Design

The proponent employs mixed methods of research such as developmental and descriptive-evaluative research methods. According to (Richey & Klein, 2005) the developmental method is a systematic approach to designing and evaluating programs, processes, and products that must meet the criteria of internal consistency and effectiveness. This method was deemed appropriate as the study involved analysing and describing an evaluation system process. While the descriptive-evaluative research method is a research approach that combines descriptive and evaluative elements. It aims to provide a detailed account of the characteristics and features of a phenomenon or subject (e.g., what is happening, who is involved, and when it occurs). Further, it is used to assess the effectiveness, quality, or impact of that

phenomenon against specific criteria or standards (e.g., how well it works and to what extent it meets its objectives).

In this project, a system was developed and deployed for faculty members, staff, and students of MSU-Maguindanao. Following the system's development processes, the researcher conducted a system performance evaluation using survey questionnaires to assess system quality, information quality, ease of use, usefulness, and acceptance. The evaluation also examined the system's significance for different user groups (admin and faculty, staff, and students) and compared the speed and accuracy of the developed system with conventional methods.

Data Gathering Procedure

The capstone project follows the standard operating procedures in gathering the necessary data. After securing the approval of the Dean of the graduate school to conduct the project, the researcher prepared and executed the following:

The researcher identified and analyzed the problem based on the proposing a solution. Permission letters to the administrators have been sought before the actual consultation meeting with the Deans, the program heads, and the students. Upon approval, the researcher asks permission from the office of the Center of Information, Education, and Communication (CIEC) for the recommending approval and to the office of the chancellor for this approved permit was presented to the respective Head of offices down to the faculty member, staff, and students.

Interviewed and document reviews about the process of TPSDA and the difficulty of the manual system were also done. The data and information gathered are necessary for the system development. For the evaluation of the developed system, a questionnaire was also presented to the head of offices, faculty members, staff, and students.

Data Gathering Instrument

This capstone project used an adapted instrument to assess the performance of the developed system. The survey questionnaire was intended for all three (3) groups of participants namely: admin and faculty members, staff, and students. For the evaluation of the developed system, the questionnaire was adapted from the study of Alshibly (2014).

The survey tool primarily focused on participants' perceptions of the **performance of the developed system**. It covered **six (6) indicators** for system quality, **eight (8) indicators** for information quality, **four (4) indicators** for ease of use, **seven (7) indicators** for usefulness, and **three (3) indicators** for acceptance. Regarding the **significance of speed and accuracy** across different user groups (**administrators, faculty, staff, and students),** the survey included **five (5) indicators** for speed and **five (5) indicators** for accuracy.

For the **conventional versus the proposed system,** each category-**system quality, information quality, ease of use, usefulness, acceptance, speed, and accuracy** had **one (1) corresponding indicator.**

Participants evaluated these indicators based on their **honest observations** using a **5-point Likert scale**, as shown in **Table 4.**

Table 4. Interpretation Results of the Gathered Data.

Numerical Rating	Scale	Verbal Rating
5	4.50 – 5.00	Strongly agree
4	3.50 – 4.49	Agree

3	2.50 – 3.49	Neutral
2	1.50 – 2.49	Disagree
1	1.00 – 1.49	Strongly disagree

Statistical Tool and Treatment of Data

The data was organized, tabulated, then analyzed and interpreted using the following statistical tools.

1. The mean was computed to evaluate the performance of the developed system in terms of system quality, information quality, ease of use, usefulness, and acceptance.
2. A one-way ANOVA was employed to analyze the differences in assessments among administrators, faculty members, staff, and students regarding the acceptance, system quality, information quality, ease of use, and usefulness of the developed system.
3. A t-test was used to compare the conventional method with the proposed system, specifically in terms of speed and accuracy.

Respondents of the Study

The respondents of the project were divided into three (3) groups namely: the admin and faculty, the staff, and the students.

The groups consisted of 16 Admin and Faculty, 20 staff, and 18 students from the different offices or colleges of MSU-Maguindanao.

Survey questionnaires were distributed to the respondents to gather the needed data. The respondents then evaluated the TPSDA.

Sampling Techniques

The project utilized the Slovin formula to get the sample size of the respondents. According to (Wulanda & Kumiasih, 2019), when the population is too large to sample every member directly, Slovin's formula can be used to calculate the number of samples needed.

In this study, Slovin's formula was used to determine the exact and appropriate number of respondents based on the given population. With this, the researcher selected 16 Admin and Faculty members, 20 staff, and 18 students from the different colleges or offices of MSU-Maguindanao.

III. RESULTS AND DISCUSSION

This chapter presents the results of the study based on the data gathered. The findings are presented as follows: an evaluation of the proposed system, an analysis of the most significant rating, and an assessment of the extent to which respondents agree that the Transaction Processing System with Data Analytics (TPSDA) is preferable to the conventional method.

4.1. Evaluation of the Developed System

The data in Tables 5, 6, 7, and 8, show the evaluation of the developed system as to its systems quality, information quality, and ease of use.

4.1.1. System Quality

Table 5 reflects the mean and interpretation of the responses on items related to system quality. System quality indicates the measure of an IS from the technical and design perspectives(Sys, 2003).

As shown in table 5, all respondents rated the items as "Agree." This includes statements such as: "The system allows information to be readily accessible to you" (mean = 4.38); "The system makes information very accessible" (mean = 4.36); "The system is easy to use the first time I access it" (mean = 4.34); "The system can flexibly adjust to new work demands" (mean = 4.28); "The system returns answers (Sys,

2003)to my requests quickly" (mean = 4.36); and "The system is versatile in addressing needs as they arise" (mean = 4.30).

Table 5. Effectiveness of the TPSDA Based on System Quality.

No.	Items	Mean	Verbal Description
1	TPSDA allows information to be readily accessible to you.	4.38	Agree
2	TPSDA makes information very accessible.	4.36	Agree
3	TPSDA is easy to use the first time I access it.	4.34	Agree
4	TPSDA can flexibly adjust to new work demands.	4.28	Agree
5	TPSDA returns answers to my requests quickly.	4.36	Agree
6	TPSDA is versatile in addressing needs as they arise.	4.30	Agree
	Mean	4.25	Agree

The overall mean score is 4.25, with an interpretation of "Agree," indicating that the developed **Transaction Processing System with Data Analytics (TPSDA)** meets system quality standards. This result aligns with the findings of (Alshibly, 2014), which suggest that improvements in information system quality enhance user satisfaction. A higher-quality system leads to greater user satisfaction and increased usage, ultimately improving individual productivity. This, in turn, contributes to overall organizational productivity (Hawash et al., 2023).

4.1.2. Information Quality

Table 6 presents the mean scores and interpretations of responses related to information quality. The results indicate that the developed software information quality represents a user's reaction to the characteristics of output information versus the user's information requirements (Alshibly, 2014).

As shown in Table 6, the effectiveness of the system's information quality is evident. Respondents rated several items as "Agree," reflecting a positive perception of the system's ability to deliver quality information. Specifically, Item 3 ("The outputs are presented in a useful format") received a mean rating of 4.24. Similarly, Item 2 ("The information content provided by the system meets my needs") and Item 5 ("The system provides up-to-date information") were rated "Agree," with mean scores of 4.00 and 4.30, respectively.

Additionally, the table below shows that Item 7 ("Information is clear"), Item 8 ("Information is accurate"), and Item 4 ("Provides reports that seem to be exactly what I need") each received a mean rating of 4.32, indicating strong user agreement on these aspects. Moreover, Item 1 ("Provides sufficient information") was rated "Agree," with a mean score of 4.34.

Table 6. Effectiveness Rating of the TPSDA Based on Information Quality.

No.	Items	Mean	Verbal Description
1	TPSDA provides sufficient information.	4.34	Agree
2	The information content provided by TPSDA meets my needs.	4.30	Agree
3	TPSDA outputs are presented in a useful format.	4.24	Agree
4	TPSDA provides reports that seem to be just about exactly what I need.	4.32	Agree
5	TPSDA produces comprehensive information.	4.30	Agree
6	TPSDA provides up-to-date information.	4.38	Agree
7	TPSDA information is clear.	4.32	Agree
8	TPSDA information is accurate.	4.32	Agree
Mean		**4.32**	**Agree**

Notably, Item 6 ("Provides up-to-date information") received the highest rating, with a mean score of 4.38, further reinforcing the system's effectiveness in delivering timely and relevant information. The overall mean of 4.32, interpreted as "Agree," highlights the strong information quality of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA).

This result aligns with previous studies, such as (Alshibly, 2014), which found that perceived information quality is the most critical factor influencing EDMS adoption. The study emphasized that the extent to which an EDMS provides sufficient, comprehensive, clear, accurate, and up-to-date information plays a crucial role in its success. Similarly, (Sys, 2003) identified information quality as a key dimension in evaluating the effectiveness of information systems.

4.1.3. Ease of Use

Table 7 shows the effectiveness of the perceived ease of use of the developed system. The ease of use in software development refers to the degree to which a person believes that using a particular system would be free from physical and mental effort (Perdana et al., 2023).

As shown in the table above, all items under perceived ease of use were rated 'Agree' by the respondents. The specific ratings are as follows: 'It is easy for me to become skillful at using TPSDA' (mean = 4.22), 'I find it easy to get TPSDA to do what I want it to do' (mean = 4.24), 'I find TPSDA easy to use' (mean = 4.26), and 'Learning to operate TPSDA is easy for me' (mean = 4.26).

Table 7. Effectiveness Rating of the TPSDA Based on Ease of Use.

No.	Items	Mean	Verbal Description
1	Learning to operate TPSDA is easy for me.	4.26	Agree
2	I find it easy to get TPSDA to do what I want it to do.	4.24	Agree

3	It is easy for me to become skillful at using TPSDA.	4.22	Agree
4	I find TPSDA easy to use.	4.26	Agree
Mean		**4.25**	**Agree**

The overall mean score of 4.25, classified as 'Agree,' demonstrates the effectiveness of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA) in terms of ease of use.

This finding aligns with previous research by (Chibuye & Phiri, 2022), who found that firms with strong and favorable perceptions of a system's usefulness tend to use it more than those with a weak or unfavorable perception. Furthermore, as suggested by (Alshibly, 2014), technologies perceived as easy to use are generally considered useful, highlighting the direct relationship between perceived ease of use and perceived usefulness.

4.1.4. Usefulness

Table 8. Effectiveness Rating of the TPSDA Based on Usefulness.

No.	Items	Mean	Verbal Description
1	Using TPSDA enables me to accomplish the job's tasks more quickly.	4.26	Agree
2	Using TPSDA enables me to perform work requirements more quickly.	4.26	Agree
3	Using TPSDA improves my job performance.	4.22	Agree
4	Using TPSDA in my job increases my productivity.	4.26	Agree
5	Using TPSDA enhances my effectiveness in the job.	4.30	Agree
6	Using TPSDA makes it easier to do my job.	4.24	Agree
7	Using TPSDA improves my ability to make good decisions.	4.24	Agree
Mean		**4.25**	**Agree**

Table 8 presents the effectiveness of the developed system's usefulness. According to (Chibuye & Phiri, 2022), there exists a direct effect of perceived ease of use on perceived usefulness. As reflected in the table above, all items under perceived usefulness were rated as 'Agree' by the respondents.

The specific ratings for each item are as follows: 'Using the system improves my job performance' (mean = 4.22), 'Using the system improves my ability to make good decisions' (mean = 4.24), 'Using the system makes it easier to do my job' (mean = 4.24), 'Using the system enables me to accomplish job tasks more quickly' (mean = 4.26), 'Using the system helps me meet work requirements more efficiently' (mean = 4.26), 'Using the system increases my productivity' (mean = 4.26), and 'Using the system enhances my job effectiveness' (mean = 4.30).

The overall mean score of 4.25, categorized as 'Agree,' highlights the effectiveness of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA) in terms of usefulness.

This study aligns with previous research. Wherein usefulness and ease of use as two distinct factors influencing technology adoption due to their positive correlation. However, findings from the first two applications of TAM indicated that usefulness is a significantly stronger determinant than ease of use (Alshibly, 2014).

Ultimately, the most significant influence on reconciliation is perceived usefulness and perceived ease of use and the frequency of actual usage has a smaller effect so that it does not become an obstacle to the reconciliation process (Kosadi et al., 2021).

4.1.5.Acceptance

Table 9 indicates the effectiveness of the developed system's acceptance. To understand the factors influencing users' acceptance of the developed system, four regression models were built for a path analysis.

Table 9. Effectiveness Rating of the TPSDA Based on Acceptance.

No.	Items	Mean	Verbal Description
1	I like the idea of using TPSDA	4.26	Agree
2	I have a generally favorable attitude toward using TPSDA	4.24	Agree
3	I believe it is (would be) a good idea to use TPSDA	4.32	Agree
Mean		**4.27**	**Agree**

The independent variables are system quality, information quality, perceived ease of use, and perceived usefulness, while the dependent variable is acceptance (Alshibly, 2014).

As indicated in the table above, the specific ratings for each item are as follows: 'I like the idea of using TPSDA' (mean = 4.26), 'I have a generally favorable attitude toward using TPSDA' (mean = 4.24), and 'I believe it is (would be) a good idea to use TPSDA' (mean = 4.32).

The overall mean score of 4.27, categorized as 'Agree' highlights the effectiveness of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA) in terms of acceptance.

The finding aligned with the previous result of the study in the system quality, information quality, and perceived usefulness have a related significant effect on EDMS acceptance, suggesting that the TAM could also extend into the EDMS (Alshibly, 2014). In support, of the Technology Acceptance Model (TAM), with the independent variables of ease of use and usefulness (PU)(Rosly & Khalid, 2018).

4.2. Significantly Emerging Ratings Across Admin and Faculty, Staff, and Students

It is shown in Table 10 that the use of TAM in acceptance studies is comprehensive, based on the significant relationship between System Quality, Information Quality, Ease of Use, Usefulness, and Acceptance (Alshibly, 2014).

Table 10 presents the analysis of System Quality, Information Quality, Ease of Use, Usefulness, and Acceptance, with the effectiveness of the Innovating ICT Transaction Processing System with Data

Analytics (TPSDA). System Quality, as shown in Table 9, indicates that the "between groups" values are SS = 2.027, df = 2, F = 1.014, MS = 6.139, and P-Value = 0.004.

The "within groups" values are SS = 8.421, df = 51, and F = 0.165, while the "total" values are SS = 10.449, df = 53. These results suggest that system quality is statistically significant, highlighting a notable difference in perception among the admin, faculty, staff, and students regarding TPSDA's effectiveness.

Table 10. Significantly Emerging Ratings Across Admin, Faculty, Staff, and Students.

Indicator	Source of Variation	SS	Df	F	MS	P-Value
System Quality	Between Groups	2.027	2	1.014	6.139	0.004
	Within Groups	8.421	51	0.165		
	Total	10.449	53			
Information Quality	Between Groups	1.951	2	0.975	5.911	0.005
	Within Groups	8.415	51	0.165		
	Total	10.366	53			
Ease of Use	Between Groups	0.912	2	0.456	2.990	0.059
	Within Groups	7.775	51	0.152		
	Total	8.686	53			
Usefulness	Between Groups	0.569	2	0.284	1.661	0.200
	Within Groups	8.735	51	0.171		
	Total	9.303	53			
Acceptance	Between Groups	0.619	2	0.309	1.582	0.216
	Within Groups	9.974	51	0.196		
	Total	10.593	53			

For Information Quality, the "between groups" values are SS = 1.951, df = 2, F = 0.975, MS = 5.911, and P-value = 0.005, indicating a significant difference in perception regarding the system's information quality.

The "within groups" values are SS = 8.415, df = 51, and F = 0.165, while the "total" values are SS = 10.366, df = 53. As shown in Table 9, information quality is significant, demonstrating a substantial difference in perception among administrators, faculty, staff, and students regarding TPSDA's effectiveness.

As shown in the table above, for ease of use, the "between groups" values are SS = 0.912, df = 2, F = 0.456, MS = 2.990, and P-value = 0.059. The "within groups" values are SS = 7.775, df = 51, and F = 0.152, while the "total" values are SS = 8.686, df = 53. The results indicate that ease of use is significant, but there is no significant difference in perception among administrators, faculty, staff, and students regarding TPSDA's effectiveness.

For usefulness, the "between groups" values are SS = 0.569, df = 2, F = 0.284, MS = 1.661, and P-value = 0.200. The "within groups" values are SS = 8.735, df = 51, and F = 0.171, while the "total" values are SS = 9.303, df = 53. The results indicate that usefulness is significant, but there is no significant difference in perception among administrators, faculty, staff, and students regarding TPSDA's effectiveness.

For acceptance, the "within groups" values are SS = 9.974, df = 51, and F = 0.196, while the "total" values are SS = 10.593, df = 53. The results indicate that acceptance is significant, but there is no significant

difference in perception among administrators, faculty, staff, and students regarding TPSDA's effectiveness.

Based on these findings, system quality and information quality are significant, indicating a notable difference in perception among administrators, faculty, staff, and students regarding the effectiveness of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA). Meanwhile, the results for ease of use, usefulness, and acceptance were also significant; however, there was no significant difference in perception among administrators, faculty, staff, and students regarding TPSDA's effectiveness.

These findings align with previous studies. Wherein systems have become more common and standardized, users are increasingly competent in using EDMS (Alshibly, 2014). Additionally, the use of e-Daftar has proven to be highly effective for information management training, particularly when user acceptance of the system is high (Rosly & Khalid, 2018).

4.3. Extent of Agreement on TPSDA Preference Over the Conventional Method in Speed and Accuracy

The successful implementation of a developed system is dependent on the extent to which such a system is used and eventually adapted by potential users (Kalayou et al., 2022).

Table 11 presents the statistical results of the t-test in between speed and accuracy and also indicates the Mean, standard deviation (SD), t-stat, degrees of freedom (df), p-value(2-tailed), critical value, decision, and interpretation.

Table 11. Conventional Way of the TPSDA.

Variables		Mean	SD	t-stat	Df	p-value (2-tailed)	critical value	Decision	Interpretation
Speed	Conventional	4.24	0.136	-3.239	53	.002	2.006	Reject the null hypothesis.	There is a significant difference.
	Proposed	4.44	0.252						
Accuracy	Conventional	4.22	0.154	-4.488	53	.000	2.006	Reject the null hypothesis.	There is a significant difference.
	Proposed	4.48	0.254						

As reflected in the table above, the speed of the conventional and proposed systems has a mean of 4.24 and 4.44, respectively. The standard deviations are 0.136 and 0.252. The t-statistic is -3.239, with 53 degrees of freedom (df), a two-tailed p-value of 0.002, and a critical value of 2.006. Based on these results, the null hypothesis is rejected, indicating a significant difference between the two systems.

Overall results indicate that there is a significant difference in speed as perceived by admin and faculty, staff, and students regarding the effectiveness of the Innovating ICT Transaction Processing System with Data Analytics (TPSDA).

In terms of Accuracy; Mean: 4.44 and 4.48, SD: 0.154 and 0.254, t-Statistic: -4.488, Degrees of Freedom (df): 53, P-Value (2-tailed): 0.000, Critical Value: 2.006, the null hypothesis is rejected, therefore, there is a significant difference.

The overall findings indicate that accuracy was positively rated in the developed system, further supporting the decision to reject the null hypothesis. This suggests that there is a significant difference in accuracy perceptions among the respondents.

Finally, the results indicate that the supporting decision rejected the null hypothesis, and the interpretation between speed and accuracy indeed indicates that there is a significant difference in the perception among the proponents of the TPSDA effectiveness.

This supports the idea that perceived usefulness significantly influences EDMS adoption, reinforcing the applicability of the Technology Acceptance Model (TAM) in the EDMS context (Alshibly, 2014).

Changes in the transition from conventional payments to payments using financial technology services are influenced by various factors that support changes in transaction activities, Some factors Namely: Information System Flexibility and length of Transaction Time (Ikhwana & Safira, 2023).

Extending these findings, the Analysis of Transaction Processing Systems (TPS) in the Context of Information System Development in Organizations highlights the fundamental characteristics of TPS, including high-speed processing, and accuracy. Given its ability to handle large volumes of data efficiently, plays a crucial role in daily organizational (Fattima et al., 2024).

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CITATIONS

In today's digital age, most transaction systems depend on modern technology innovations, including mobile phones, computers, the Internet, etc. In this modern technology innovation, the transaction processing system is the backbone of all transactions across businesses, public and private organizations, government agencies, and academic institutions **(Kwadade-Cudjoe, 2020).**

Similarly, the transaction processing system plays a crucial role in academic institutions by streamlining various administrative and operational tasks **(Brooks, 2011).**

To transaction processing system plays a crucial role, organizations integrate conventional networking infrastructures that support seamless data processing **(Wahsheh, 2023).**

Some of the major transaction processing systems include subsystems of the system that are commonly found in most organizational firms. In larger organizations and institutions, where most operations are already computerized, concedes that these subsystems of the system serve a variety of purposes **(Mahar & Khuzdar, 2014).**

The problem discussed the variety of sub-systems of a system, and software used to support transaction processing systems in businesses and organizations including "traditional network systems" that can support a certain level of network management system, "advanced systems" capable of supporting every level of management system, and "blockchain systems" focus on network system security **(Tripathi et al., 2023).**

On the other hand, acknowledge that the transaction processing system operates at the operational level of an organization, facilitating real-time transaction processing and ensuring smooth business operations **(Muslihah & Nastura, 2020).**

Additionally, believed that these transaction processing systems improve efficiency, they also introduce potential security risks and vulnerabilities that must be addressed to maintain system integrity **(Wahsheh, 2023).**

The Fundamental Principles of Data Analytics, **(Provost & Fawcett, 2013)** argue that the high level of data analytics follows fundamental principles that guide the extraction of knowledge from data as well as acknowledging that one such principle has been adopted to support educational innovation in the Digital and Technology Solutions (Data Analytics) Pathway at Winchester

For over 40 years, TPS technology has been central to business operations, underscoring its enduring significance. The historical evolution of TPS demonstrates its critical role in both business and software technology landscapes, showcasing its robustness and adaptability **(Morgan et al., 2009).**

(Gantz et al., 2020) emphasized its contribution to smooth enterprise functioning and the vital role of transactional data in daily processes. Similarly **(Perdana et al.,2023)** highlight how TPS is integral to organizational infrastructure, ensuring seamless transactions and accurate financial record-keeping as part of essential operations support systems. Furthermore, TPS serves as a fundamental information infrastructure that facilitates daily business transactions such as sales and purchases **(Fattima et al., 2024).**

The Shipping System manages the receipt, addressing, and shipping of packages, ensuring efficient delivery **(Kosadi et al., 2021).**

The Accounts Payable System manages payments to suppliers and oversees cash management activities to maintain financial stability. Lastly, the General Ledger System integrates transaction data for budget planning, cost allocation, and profitability accounting. Collectively, these subsystems enhance operational efficiency, financial accuracy, and decision-making processes within an organization **(Mahar & Khuzdar, 2014).**

Transaction Processing Systems (TPS) play a vital role in various sectors, including transportation, finance, retail, telecommunications, manufacturing, government, and the military, facilitating critical services such as electronic reservations, banking, stock exchanges, order processing, and shipment tracking **(Morgan et al., 2009).**

The integration of Information Technology (IT) enhances the efficiency of TPS, addressing the limitations of manual transaction processing and improving overall operational effectiveness **(Mahar & Khuzdar, 2014).**

TPS operates based on fundamental principles, including Batch Processing, which involves collecting and processing transactions at specific intervals, and Real-Time Processing, which processes transactions instantly as they occur **(Perdana et al., 2023).**

The increasing demand for online services further underscores the significance of TPS in ensuring seamless, secure, and efficient digital transactions **(Factor et al., 2016).**

Mobile phones are compact and easy to carry, making them an essential part of everyday life. They run on various operating systems, such as Android, iOS, etc. Users can download apps from the Play Store **(Godwin-jones, 2008).**

It provides remote accessibility to certain functionalities and data within the in-car Project 54 system. The system was designed and implemented using a palm-sized computer, a two-dimensional barcode scan engine, and wireless communication modules **(Academy, 2001).**

In addition to the proposed transaction model, an open nested transaction model is introduced. This model supports asynchronous execution of different parts of a distributed transaction and allows recovery when a sub-transaction becomes unavailable for an extended period. The study also includes a comparison of the developed model with existing ones, demonstrating its advantages **(Patel, 2008).**

To address this issue, the study proposes a smartphone-based Android application that streamlines the process, making it more efficient, secure, and less error-prone **(Kadam et al., 2017).**

To mitigate these challenges, a new processing model was implemented in a real-world public transportation mobile payment system, proving to be a robust solution for small-value touch-and-go mobile ticketing transactions **(Rulić et al., 2017).**

Design and Implementation of Various Payment Systems for Product Transactions in Mobile Applications makes changes to the payment method and must also follow the scheme of e-commerce, namely payments connected to the internet, a payment system was tested on local e-commerce applications, the system was built on mobile applications and web services with the REST API, mobile applications as clients and web services as servers **(Islamiati, 2019).**

Impact of mobile wallets on cashless transactions, due to technology mobile users can nowadays use their smartphones to make money transactions or payments by using applications installed on the phone also mobile payment increased the usage of electronic payment where goods and services are transacted without the use of physical cash, additionally, the growth of mobile applications and mobile wallets positively contribute to economic growth and cashless transaction **(Sarika & Vasantha, 2020).**

They employ observation, elicitation, SWOT analysis, Unified Modeling Language (UML), prototyping, and black-box testing as methods for data collection, analysis, design, and evaluation **(Faisal & Debora, 2020).**

Payment fraud refers to any type of fraudulent or illegal transaction carried out by a cybercriminal, additionally, that is safe against fraud enables simple and efficient transactions, and implements security

measures. The method is using the Waterfall methodology as a Software Development Life Cycle **(Solehah et al., 2023)**

In the banking system, *Banking as a Service for Transaction Banking Using Service-Oriented Modeling Architecture Methodology* **(Gaol et al., 2023)** explores how banks can gain a competitive edge by gradually replacing direct face-to-face interactions with virtual interactions.

To make sense of the data, various tools are used, such as graphs for visual representation and data mining techniques to identify patterns, trends, and connections within large datasets **(Raghupathi & Raghupathi, 2014).**

A study grouped common practices, tools, challenges, and organizational issues into high-level categories. As more data was gathered, it iteratively refined these categories, identifying recurring patterns in the analytic process and enumerating the most common and severe challenges faced **(Kandel et al., 2012)**

Challenges and Solutions in Big Data: Meeting Big Data Challenges with Visual Analytics **(Louise et al., 2014).**

Connecting Decentralized Learning Records: A Blockchain-Based Learning Analytics Platform **(Ocheja et al., 2018).**

Analyzing the factors that influence operational speed requires an examination of key infrastructure components, including CPU speed, memory allocation, cache configuration, and other related factors. These elements can directly or indirectly impact computational efficiency when processing data **(L. Wang et al., 2020).**

The research paper by (Gantz et al. **2020**) explores the digital universe in 2020, focusing on Big Data, expanding digital footprints, and significant growth in the Far East. Although data in the digital universe can travel at internet speeds across the globe, its impact varies by region Data Analytics Research-Informed Teaching in a Digital Technologies Curriculum **(Lu, 2020).**

Artificial Intelligence and Medical Records. An AI algorithm with ICD coding technology, guided by an embedded Electronic Medical Record (EMR) system, was utilized in medical record information management **(C. Wang et al., 2021).**

The advanced Technology Acceptance Model (TAM) has been applied to assess behavioral intention toward using eHealth for the sustainable adoption of eHealth technologies. Perceived usefulness and perceived ease of use were also identified as key determinants influencing attitudes toward eHealth and the intention to use **(Kalayou et al., 2022).**

High-Performance Big Data Analytics: Computing Systems and Approaches **(Capurro et al., 2022).**

The research by **(Zhang et al., 2023)** empirically investigates the effect of perceived ease of use (PEU), perceived usefulness (PU), and data security (DAS) on the adoption intention of Fintech services.

The study by **(Ogutu et al., 2023)** explores current trends in sustainable organizational management through a bibliometric analysis. Organizational sustainability is a business approach aimed at creating long-term value by considering how an organization operates within ecological, social, and economic environments.

This capstone project employs a developmental research design. According to **(Richey & Klein, 2005)** the developmental method is a systematic approach to designing and evaluating programs, processes, and products that must meet the criteria of internal consistency and effectiveness. This method was deemed appropriate as the study involved analyzing and describing an evaluation system process.

This result aligns with the findings of **(Alshibly, 2014),** which suggest that improvements in information system quality enhance user satisfaction.

A higher-quality system leads to greater user satisfaction and increased usage, ultimately improving individual productivity. This, in turn, contributes to overall organizational productivity **(Hawash et al., 2023).**

The results indicate that the developed software information quality represents a user's reaction to the characteristics of output information versus the user's information requirements **(Alshibly, 2014).**

This finding aligns with previous research by **(Chibuye & Phiri, 2022),** who found that firms with strong and favorable perceptions of a system's usefulness tend to use it more than those with a weak or unfavorable perception.

Ultimately, the most significant influence on reconciliation is perceived usefulness and perceived ease of use and the frequency of actual usage has a smaller effect so that it does not become an obstacle to the reconciliation process **(Kosadi et al., 2021).**

The finding aligned with the previous result of the study in the system quality, information quality, and perceived usefulness have a related significant effect on EDMS acceptance, suggesting that the TAM could also extend into the EDMS (Alshibly, 2014). In support, of the Technology Acceptance Model (TAM), with the independent variables of ease of use and usefulness **(PU)(Rosly & Khalid, 2018)**