

Operational Level System: Transaction Processing System and Decision Making

Firas Rashed Wahsheh

Asst. Prof. Dr., Department of
Management Information Systems
Faculty of Business, Ajloun National
University,
Ajloun, Jordan
f.wahsheh@anu.edu.jo

Ziyad Marie

Public administration Department,
Faculty of Administrative sciences and
Informatics, Al-Istiqlal University,
Jericho, 10,
Palestine
Ziyad.marie@pass.ps

Mazen Mohammed Farea

Assoc. Prof. Dr., Faculty of Finance &
Administrative Sciences,
Al-Madinah International University,
Malaysia
mazen.farea@mediu.edu.my

Wafa Abdulkareem Al-Haithami

Faculty of Finance and Administrative
Sciences, MEDIU,
Malaysia
fafikareem2017@gmail.com

Fatma Susilawati Mohamad

Assoc. Prof. Ts. Dr., Faculty of
Informatics and Computing, UniSZA,
Malaysia
fatma@unisza.edu.my

Neeraj Bisht

Asst. Prof. Dr., Birla Institute of
Applied Sciences,
Bhimtal, India
bisneeraj@gmail.com

Abstract—This research paper investigates the critical role of Operational Level Systems (OLS) in facilitating transaction processing and supporting decision-making within modern organizations. In today's fast-paced and data-driven business environment, OLS plays a pivotal role in capturing, processing, and disseminating real-time data to aid in operational efficiency and effective decision-making. This study aims to explore the functionalities and interconnections of Transaction Processing Systems (TPS) as integral components of OLS, and their contribution to informed decision-making at the operational level. To achieve this, an extensive literature review is conducted to comprehend the theoretical underpinnings and practical implications of OLS and TPS. Additionally, empirical data are collected through surveys, interviews, and case studies from various industries to gain insights into the real-world implementation and benefits of OLS and its impact on decision-making processes. The findings reveal that OLS, with its robust TPS, provides organizations with streamlined data processing capabilities, enabling seamless handling of day-to-day transactions, such as sales, inventory management, and financial transactions. Moreover, it facilitates the efficient storage and retrieval of vast amounts of transactional data, laying the foundation for data-driven decision-making. Furthermore, the research highlights the significance of the integration between TPS and decision-making systems, emphasizing the pivotal role of OLS in supporting operational managers in making well-informed decisions. The ability to access real-time transactional data empowers decision-makers to identify trends, patterns, and potential bottlenecks, leading to timely adjustments and optimized performance. This research sheds light on the vital role of Operational Level Systems, particularly Transaction Processing Systems, in today's business landscape. By efficiently processing transactions and providing timely information for decision-making, OLS proves to be an indispensable tool for enhancing operational effectiveness and achieving competitive advantage. The findings of this study provide valuable insights for organizations seeking to harness the potential of OLS to streamline operations and improve decision-making processes at the operational level.

Keywords— Transaction Processing System, Operational Level System, e-commerce

I. INTRODUCTION

The use of computers and information systems in business is highly required these days. From a simple level of grocery stores to international level of trading, computers are used in almost every level of business operations. In a business information system (BIS) or Management Information System (MIS), the Transaction Processing System (TPS) is a system that runs at the operational level category [1].

In modern BIS, TPS is a computerized system that systematically processes every detail of business routine at the operational level including bringing out the necessary information and structured reports required to the next level of business operations [2]. This study will look into recent research and literature that discuss TPS and will explore almost every aspect of TPS such as the requirements, the devices, the routines, the systems, the software, the functions, the advantages and the disadvantages. This study hopefully will outline the information on recent TPS systems and innovations, see Figure 1.

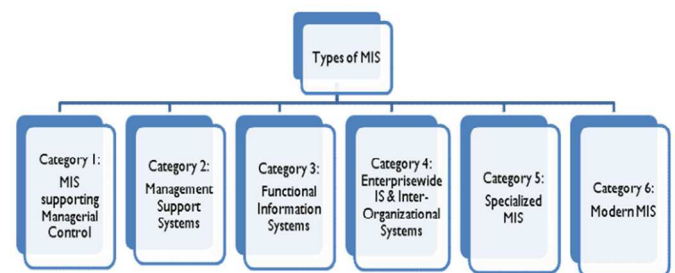


Fig. 1. MIS Category

II. LITERATURE REVIEW

A. Transaction Processing System

At the operational level of Management Information System (MIS) a system called Transaction Processing System or TPS uses inputs, executes processes and outputs necessary business routines and produces the information and reports required to run the business [3].

In this era of modern business systems, computers play important roles not only to address the operational data needs of an organisation but also to record and execute the computational analysis and feed the information for payroll routines or accounting activities as an example on Data Driven TPS [4].

As the earliest computerized systems, TPS expands into various and cross functional information systems to fulfil any occurrence of business processes and transactions [5]. In business processes, the TPS used at the OLS and the repetitive occurrence of changes and additions happen accordingly, as shown in Figure 2.

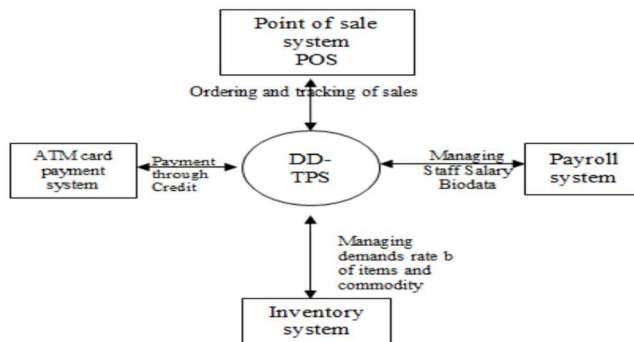


Fig. 2. DD-TPS Concept

Various researches conducted to overcome these problems [6]. Some proposed innovative cloud services to execute virtual system infrastructure as a modern computing environment while others propose deterministic database systems in education [7] such as libraries [8] or universities [9]. On the other hand, there are proposals on deterministic TPS which tackle the improvement of the traditional systems [10].

Most of the problems in TPS which bring the conflict with the customers is carelessness in updating the system database or goods price tags. It clearly outlines the conflict between customer services and inventory management as an example. On the other hand, the Decision Support System (DSS) can rely on the TPS system as a dominant guideline for decision making [11].

In some areas, using a simple innovation on spreadsheets could help manage the unorganized system [12]. Organizational learning is a key factor for further improvement in the system [13]. This study will look further into TPS concepts reviews available.

B. Accounting Systems

In every business company or management firm, even a university, the financial system is some sort of management level. In the financial system, the accounting system plays vital roles. There are many accounting system types considered as operational level TPS and financial accounting are major activities and routines in business and office management systems.

Traditional accounting system records on books and ledgers, many have transformed into using information systems for transaction activities, compared to traditional methods that execute the processes separately, computerized financial

accounting systems automate many steps in the processes, shorten the time and reduce errors [14].

In business or management modernization, implementation of information technology is necessary [15]. Nowadays, almost every business uses computer and accounting application software and devices [16].

C. Electronic Health Records

Health management is some kind of a large scale data management system that should provide every essential data, records and information on every activity in the health system management with no error tolerance.

This system can rely on big data management that can stand large transactions in a shorter period of time [17]. Electronic Health Records is one of the electronic health systems listed as a patient records system (PRS). PRS is categorised as primary TPS which include the evaluation of patient health.

An electronics evaluation system based on user's willingness is hard in developing countries compared to other advanced countries [18]. Study on blood banks in the Philippines shows that even though they have such a TPS system, some innovation on TPS will counter the unorganized data that consume the time for information retrieval [19].

D. Big Data and Blockchain Technology

The Internet of Thing (IoT) is about network communication technology between the sensor devices, computer technology or controllers and the embedded system. There billions of devices that are connected today and the use of big data and security concerns erupt [20]. Based on TPS operation, many studies did research on blockchain technology as TPS medium of operation.

Blockchain technology architecture is a new application system that comes with better issues on data security. There are problems of trust in an open network that should be solved using blockchain technology but still cannot compromise the efficiency needed in large amounts of transactions. Three disadvantages mainly in blockchain technology are listed as inefficiency in performance, delay in confirmation and functions [21, 22] while the key performance in TPS is rapid response, reliability and data control [23, 17].

Most TPS focus on reducing processes level and time period. The lack of performance in the current blockchain system will rule out blockchain technology from TPS at the large-scale operational system level compared to other database systems [24]. In the supply chain system, study shows that blockchain systems are improving [25] and will support large scale transactions with high security values [26].

There are also studies and proposals on implementing hybrid algorithms for better performance [27], and proposals on multilayer blockchain or multi-blockchain for better performance and processing speed [28], while literature [29] proposed there are problems in introducing new technology implementation in an organisation due to cost or trust, see Figure 3.

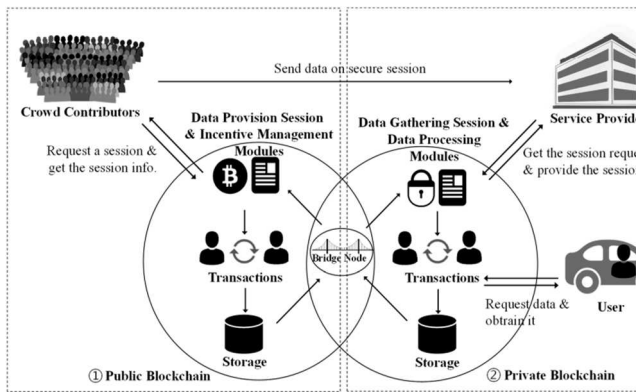


Fig. 3. Multi-blockchain system proposal

E. E-Commerce Company

Go-Jek TPS concepts include every step required in booking, sales, payments, payroll, users or customers-riders-sellers connections, collaborators etc [30]. Study on Uber drivers also shows that flexibility in TPS is some of Uber's system value [31]. The TPS system solely relies on web and mobile device system performance [32] and the responsive cloud system [33] will enhance the operation of e-commerce companies to tackle the customers [34].

Study on eBay system shows that trust factors play some roles regarding international transaction and goods delivery also. Literature suggests an e-commerce company can communicate with customer at TPS level by using a website and good database system, see Figure 4 [35].

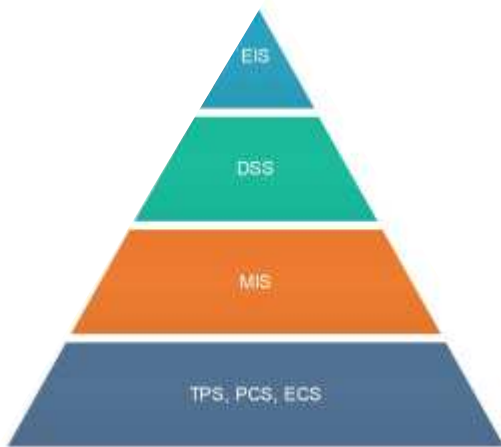


Fig. 4. Go-Jek MIS & TPS

F. TPS Application Software

There are many application software that stand in the line of the operational level system as mentioned above. As an example, Distribution Management System (DMS) Nextsoft Distribution 6 (ND6) is an application software which has been used at the TPS level of a distribution company.

This software is an offline system management network that uses a local server or intranet system that connects whole departments in a business or management. Study shows that even if the system can support the TPS level, the intranet system or closed network system is still a weakness.

An open network or internet will support many devices including mobile phones that the TPS system will work better. Computers also have a time problem when the system or core

system [36] like memory card becomes obsolete after a few years of operation contrary to phones that easily can be updated or replaced.

III. PROBLEM STATEMENT

The provided problem statement discusses the variety of systems and software used to support Transaction Processing Systems (TPS) in businesses and organizations. It highlights that accounting systems, which are a type of financial system, are prevalent in nearly all types of organizations. The statement also mentions different types of systems and their characteristics, including traditional network systems, advanced systems, and blockchain systems.

Let's break down the key points in the problem statement:

- **TPS and its Importance:** The statement begins by acknowledging the significance of Transaction Processing Systems (TPS) in businesses and organizations. TPS is a type of information system that focuses on processing and managing transactions, such as sales, purchases, and financial transactions.
- **Pervasiveness of Financial Systems:** It emphasizes that financial systems, particularly accounting systems, are commonly used in various types of organizations. This suggests that managing financial data and transactions is a fundamental aspect of business operations.
- **Diversity of Systems:** The statement suggests that there is a wide range of systems and software used to support TPS. These systems differ in their capabilities and characteristics.

Different System Types:

Independent Software: Some systems are described as "independent software" that operates at a specific management system level. This means they may be focused on a particular aspect of TPS or cater to a specific organizational function.

Traditional Network Systems: There are also traditional network systems that can support a certain level of network management system. These systems likely involve conventional networking infrastructure to facilitate TPS.

Advanced Systems: Advanced systems are mentioned as capable of supporting every level of management system. This suggests that they provide comprehensive TPS support.

Security Considerations: The statement notes that some of these systems come with certain types of security warnings. This implies that there are potential security risks or vulnerabilities associated with using these systems.

- **Blockchain Systems:** The statement introduces blockchain systems, highlighting their focus on network system security. However, it also mentions that these systems have a trade-off, which is a decline in system speed. Blockchain systems are known for their security features, but they may be slower compared to traditional systems due to the consensus mechanisms they employ.

The problem statement discusses the diversity of systems used in supporting TPS in organizations. It emphasizes the prevalence of financial systems and introduces different types of TPS-supporting systems with varying levels of functionality and security considerations. Additionally, it mentions blockchain systems as a specific category known for their security but with potential speed limitations. The statement sets the stage for further exploration or analysis of these systems in the context of TPS within businesses and organizations.

IV. METHODOLOGY

As a research review on research papers, this research conducts literature on papers and journals written and published on the internet and listed in Google Scholars etc. Papers chosen also strictly to which were published after 2019 [38]. Reviews were made on selected research papers and separated into few system focus and categories.

Discussion was made on organization financial systems, especially accounting systems, healthcare system management, information technology advancement on blockchain technology and study on application software used at the operational level of TPS. From the reviews, systems or software's then enlisted to be reviewed and one system or software highlighted for further discussion in this paper

V. FINDINGS AND DISCUSSION

The findings of the study highlight the importance and benefits of using an Online Transaction Processing System (OLS) with robust Transaction Processing Systems (TPS) in organizations. Let's discuss each of these findings in detail:

Streamlined Data Processing Capabilities: OLS, supported by robust TPS, offers organizations streamlined data processing capabilities. TPS is designed to efficiently handle day-to-day transactions, such as sales, inventory management, and financial transactions. By utilizing OLS with robust TPS, organizations can automate and expedite routine tasks, leading to increased operational efficiency and reduced manual intervention in transactional processes. This automation and efficiency translate to faster and more accurate data processing, which is critical for organizations that deal with high volumes of transactions.

Foundation for Data-driven Decision-making: OLS is proficient at storing and retrieving vast amounts of transactional data. This data, collected through TPS, forms the foundation for data-driven decision-making within an organization. Transactional data includes crucial information about customer behaviour, sales patterns, inventory levels, and financial performance. When this data is organized, accessible, and properly analysed, it becomes a valuable resource for business intelligence and analytics. By leveraging transactional data through OLS, organizations can make informed decisions based on data-driven insights rather than relying solely on intuition or experience.

Integration with Decision-making Systems: The integration between TPS and decision-making systems is emphasized as crucial. This integration means that the transactional data collected by TPS is directly fed into decision-making systems, enabling real-time analysis and reporting. OLS plays a pivotal role in supporting operational managers and other decision-makers by providing them with up-to-date and accurate transactional information. This integration facilitates faster decision-making processes, as decision-makers have access to the latest data when evaluating various options and strategies.

Empowerment of Decision-makers: Access to real-time transactional data empowers decision-makers within the organization. By having immediate access to the most current data, decision-makers can identify trends, patterns, and potential bottlenecks quickly. They can use this information to make timely adjustments, optimize performance, and respond proactively to emerging challenges and opportunities. Real-time data empowers decision-makers to monitor key performance indicators (KPIs) and make data-driven decisions that align with the organization's goals and objectives.

In summary, OLS, when supported by robust TPS, enhances an organization's data processing capabilities and enables seamless handling of day-to-day transactions. The efficient storage and retrieval of transactional data through OLS create a foundation for data-driven decision-making. The integration between TPS and decision-making systems ensures that decision-makers have access to real-time data, allowing them to identify trends, make informed decisions, and optimize performance. Overall, leveraging OLS with robust TPS provides organizations with a competitive advantage in today's data-driven business environment.

At the TPS operational level in an organisation, there are many systems or software's that many business or management firms are using to date and there is always an updated version of them. E-commerce company like eBay, Go-Jek or Uber system management that most of their system is likely to rely on TPS level between customer and customer services, between users or riders and the drivers for transportation services between places and countries, between food sellers, buyers and delivery services for food services, this system plays a vital role in their business survival. Therefore, interestingly we can see the advanced transformation of the system to fulfil the demand from users and quality of services related to the company system management.

In business, the accounting system mostly depends on computer application software that comes with cost for better systems and security. This system will include interaction and transaction between customer services and customers that become large data for the accounting department to analyse and create reports. Modern application systems can automatically produce reports for higher levels of management systems in a shorter period. In a health management system, an organised data system management will ensure the information security reliability and smooth transaction processes.

A new method or transformation system of IoT and blockchain technology will take time to improvise to fulfil the demand in fast and big data transaction systems but is believed to be the one of reliable model of data management system in the future. Through literature we can see that many have proposed the advancement of the blockchain transaction

system and big data management, improvement of security issues in matters of modernisation systems and large scale management.

Most of the blockchain technology stated involve in e-commerce transactions to ensure the highest quality of services and security available in the market. With billions of transactions worldwide, many off-network companies will step out from traditional business transaction to e-commerce style of business information system.

Decision-making at the operational level of an organization involves a series of steps and considerations to ensure efficient and effective day-to-day activities. Here's a breakdown of the sequence of decision-making at the operational level:

- **Identification of the Issue or Problem:** The decision-making process typically begins when an issue, problem, or opportunity is identified within the organization. This can result from routine operations, customer feedback, data analysis, or other sources.
- **Gathering Information:** Once a problem or opportunity is identified, relevant data and information need to be collected. This may involve reviewing reports, conducting surveys, analyzing performance metrics, or consulting with relevant team members.
- **Defining Objectives and Criteria:** Clear objectives and criteria for making a decision should be established. What are you trying to achieve with this decision? What are the key factors that will influence the choice?
- **Generating Alternatives:** Operational decision-makers should brainstorm and create a list of possible solutions or alternatives to address the identified problem or opportunity. The more options considered, the better the chances of finding an effective solution.
- **Evaluating Alternatives:** Each alternative should be evaluated against the defined criteria. This evaluation can involve quantitative and qualitative analysis, cost-benefit analysis, risk assessment, and other relevant methods.
- **Decision Making:** After evaluating the alternatives, a decision needs to be made. The operational decision-maker should select the alternative that best aligns with the defined objectives and criteria.
- **Implementing the Decision:** Once a decision is made, it needs to be put into action. This may involve assigning tasks, allocating resources, and creating a detailed action plan. Effective communication within the organization is crucial during this phase.
- **Monitoring and Control:** After implementation, ongoing monitoring and control are essential to ensure that the decision achieves the desired results. Key performance indicators (KPIs) should be tracked, and adjustments made if necessary.
- **Feedback and Learning:** Operational decision-making should be a learning process. Regular feedback and evaluation of the decision's outcomes should occur. If the decision didn't yield the expected

results, it's essential to analyze why and make adjustments for future decisions.

- **Documentation and Reporting:** Decision-making at the operational level should be well-documented. This includes keeping records of the problem, the alternatives considered, the chosen solution, and the results achieved. This documentation is valuable for accountability and future reference.
- **Continuous Improvement:** Operational decision-makers should continuously seek ways to improve their decision-making processes. This can involve training, process refinement, and staying updated with industry best practices.
- **Communication:** Throughout the entire decision-making process, effective communication is vital. Stakeholders should be informed about decisions, their roles in implementation, and any changes that may affect them.
- **Adaptation:** In a dynamic environment, operational decisions may need to be adapted or revised based on changing circumstances, new information, or unexpected developments.

The sequence described above outlines a systematic approach to decision-making at the operational level of an organization. It helps ensure that decisions are well-informed, aligned with organizational goals, and capable of delivering desired outcomes.

VI. CONCLUSION

The findings of this research paper highlight the critical role of Operational Level Systems (OLS), specifically Transaction Processing Systems (TPS), in facilitating transaction processing and supporting decision-making within modern organizations. The research emphasizes that in today's fast-paced and data-driven business environment, OLS plays a pivotal role in capturing, processing, and disseminating real-time data to enhance operational efficiency and effective decision-making.

Through an extensive literature review, the study explores the theoretical underpinnings and practical implications of OLS and TPS. Empirical data collected through surveys, interviews, and case studies from various industries provide insights into the real-world implementation and benefits of OLS and its impact on decision-making processes.

The key findings of the research are as follows:

- OLS, supported by robust TPS, provides organizations with streamlined data processing capabilities, enabling seamless handling of day-to-day transactions, such as sales, inventory management, and financial transactions.
- OLS efficiently stores and retrieves vast amounts of transactional data, which forms the foundation for data-driven decision-making.
- The integration between TPS and decision-making systems is highlighted as crucial, emphasizing the pivotal role of OLS in supporting operational managers in making well-informed decisions.

- Access to real-time transactional data empowers decision-makers to identify trends, patterns, and potential bottlenecks, leading to timely adjustments and optimized performance.

Overall, the research underscores the vital role of OLS, particularly TPS, in today's business landscape. By efficiently processing transactions and providing timely information for decision-making, OLS proves to be an indispensable tool for enhancing operational effectiveness and achieving competitive advantage.

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