

**DESIGN OF AN EARLY WARNING SYSTEM-BASED INFORMATION SYSTEM  
FOR CASH ADVANCE REQUESTS  
(A CASE STUDY AT THE WEST JAVA PROVINCIAL DEPARTMENT OF  
INDUSTRY AND TRADE)**



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**ABSTRAK**

The West Java Provincial Department of Industry and Trade faces challenges in managing Cash Advances (Uang Persediaan/UP) because the process is still manual and paper-based. This condition results in the absence of early warnings for potential breaches of budget ceilings and quarterly Cash Disbursement Plans (RPD), bottlenecks in accountability reporting, limited real time monitoring, risks of human error, and weak document traceability that may lead to audit findings related to the Internal Control System (SPI). This study aims to design an Early Warning System (EWS) based information system for UP submissions in accordance with Government Regulation No. 12 of 2019 and Minister of Home Affairs Regulation No. 77 of 2020. The research employs a qualitative case study approach, with system development using the Waterfall model. Data were collected through observation, interviews, documentation review, and workflow analysis. The system is built on Google Workspace and includes EWS validation and automated notifications, a centralized database to ensure data consistency, a monitoring dashboard, and an integrated digital approval workflow. The design results in an architecture, functional requirements, and technical specifications that significantly reduce administrative processing time, enhance transparency and accountability, strengthen controls, and reduce the risk of overspending and audit findings.

**Keywords:** Financial Information System, Early Warning System, Cash Advances

## INTRODUCTION

The management of Cash Advances (Uang Persediaan/UP) at the West Java Provincial Department of Industry and Trade constitutes a crucial element of regional financial administration, as UP functions as a working advance to finance routine and urgent operational needs in accordance with the technical provisions of regional financial management (Minister of Home Affairs Regulation No. 77 of 2020). However, in practice, the processes of UP submission, recording, and accountability are still predominantly carried out through manual, paper-based mechanisms. This condition results in expenditure realization information not being presented in a timely, integrated, and consistent manner, thereby weakening monitoring functions and hindering early corrective actions. In fact, effective budget control requires the availability of timely and reliable information so that deviations can be prevented before developing into administrative or financial problems (Mardiasmo, 2018), in line with the control principles stipulated in Government Regulation No. 12 of 2019.

In practice at the West Java Provincial Department of Industry and Trade, the most tangible impact of the absence of data-driven preventive controls is evident in the alignment between expenditure realization and the quarterly Budget Allocation Plan (RAK), which serves as a reference for cash control. The lack of an early warning mechanism causes verification at the initial stage to focus primarily on activity needs and budget availability, while conformity testing against the RAK is often only conducted during the administration and reporting stages. This condition creates a recurring pattern in which transactions have already been realized, yet during the preparation of Expenditure Evidence (Tanda Bukti Pengeluaran/TBP) in the Regional Government Information System (SIPD) and the reconciliation of realizations, it is found that the submitted or realized amounts cannot be aligned with the RAK allocation for the current quarter. Given that reporting in the SIPD is prepared on a quarterly basis, such discrepancies result in fund returns for correction, delays in report input, and disruptions to the Cash Reimbursement (Ganti Uang/GU) process because accountability requirements have not been administratively fulfilled. In certain circumstances, when discrepancies cannot be reconciled within the relevant reporting period, corrective measures in the form of returning funds to the Regional Treasury are required to ensure that fund utilization remains accountable in accordance with the cash plan.

The limitations of the manual system give rise to recurring operational problems. First, the absence of an early warning mechanism makes it difficult to detect potential overruns of activity budget ceilings and quarterly Cash Advance submissions at an early stage, causing obstacles to emerge only during the TBP recording phase. This results in bottlenecks in the accountability process of the Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) and delays in the Cash Reimbursement (GU) cycle. Second, the dynamic nature of budget changes—whether through revised regional budgets (APBD Perubahan) or budget reallocations—requires repeated updates of the Budget Implementation Document (DPA) and RAK; manual updates increase workload, heighten the risk of input errors, and trigger data inconsistencies across documents (Halim & Kusufi, 2012). Third, monitoring of expenditure realization that remains periodic in nature means that budget deviations may be identified late. Fourth, reliance on physical archives weakens document traceability and complicates the verification process, particularly when supporting documents are required for audits. This series of conditions increases the risk of procedural

non-compliance and data unreliability, which may be classified as weaknesses in the Internal Control System (Sistem Pengendalian Intern/SPI) during audits (BPK RI, 2023).

Based on these phenomena, a design for an Early Warning System (EWS)-based UP submission information system is required—one that is capable of performing real-time validation against budget ceilings and RPD allocations, providing a centralized database that can be easily updated when DPA/RAK revisions occur, and presenting a monitoring dashboard to support more proactive decision-making. Accordingly, this study aims to design an EWS-based UP submission information system to enhance the effectiveness, transparency, and accountability of financial administration at the West Java Provincial Department of Industry and Trade.

## REVIEW OF LITERATURE

Accounting Information Systems (AIS) are understood as integrated systems that combine physical and non-physical components to process financial transaction data into information relevant for control and decision making (Susanto, 2017). In line with this view, information systems within organizations function to meet daily transaction processing needs, support operational and managerial functions, and generate reports for specific stakeholders (Laudon & Laudon, 2016). In the public sector, these information needs are inherent in regional financial management, which encompasses planning, budgeting, implementation, administration, reporting, accountability, and supervision (Government Regulation No. 12 of 2019). At the implementation level, Minister of Home Affairs Regulation No. 77 of 2020 emphasizes the Cash Advance (Uang Persediaan/UP) mechanism as a working advance to finance routine operations; therefore, the quality of UP submission, recording, and accountability processes becomes a key determinant of expenditure control effectiveness.

The literature indicates that risks in UP management generally do not stem from the absence of regulations, but rather from implementation and administrative aspects that are prone to inconsistency. Fauziah et al. (2023) emphasize the importance of evaluating UP procedures based on compliance with applicable regulations while also indicating the presence of administrative challenges in management practices. Suhendar (2023) likewise concludes that UP and Cash Reimbursement (Ganti Uang/GU) procedures may operate in accordance with regulations, yet document accuracy and meticulous preparation remain critical points that may give rise to errors. This is consistent with the view of Halim and Kusufi (2012), who identify delays in accountability, data inaccuracies, and weak document traceability as recurring patterns of internal control weaknesses in regional financial management.

From the perspective of national systems, the Regional Government Information System (Sistem Informasi Pemerintahan Daerah/SIPD) was developed to integrate financial management processes in a more standardized manner (Minister of Home Affairs Regulation No. 70 of 2019). Nevertheless, the effectiveness of SIPD at the operational level has not always been optimal. Arif and Firmansyah (2024) find that SIPD contributes to accountability, but its implementation faces challenges such as system errors and rapidly changing regulations, leading work units to still require more flexible supporting tools for daily control needs. These findings align with Septiani and Isnawaty (2024), who observe that although SIPD has facilitated data management, its effectiveness is constrained by

manual input errors, limited features, and server instability. Accordingly, a gap exists between the need for operational control that demands rapid responses and the limitations of systems that have not fully supported validation and early warning mechanisms at the user level.

From a control perspective, the Government Internal Control System (Sistem Pengendalian Intern Pemerintah/SPIP) is defined as an integral process that provides reasonable assurance regarding the effectiveness and efficiency of activities, the reliability of financial reporting, the safeguarding of assets, and compliance with laws and regulations (Government Regulation No. 60 of 2008). Empirically, Heinrich and Probohudono (2023) demonstrate that SPIP and the use of information technology have a significant positive effect on the quality of local government financial reports, and Masprayoga et al. (2023) reinforce that this effect increases when both are implemented simultaneously. However, Rahayu and Kanita (2023) show that partial utilization of information technology does not always have a significant impact, indicating that the benefits of technology are highly dependent on implementation design and the embedding of effective control mechanisms. Rumbayan et al. (2024) emphasize the importance of controls in cash disbursement procedures such as authorization, verification, and documentation as references for designing control features within systems.

The Early Warning System (EWS) framework is positioned as a preventive approach to identify, monitor, and communicate risk indicators as early as possible so that corrective actions can be taken in a timely manner. Kelkar, Marya, and Mysore (2024) emphasize that EWS enables the detection of anomalies in data flows before they escalate into crises. The UNDRR framework highlights four key elements of EWS: risk knowledge, monitoring and warning, communication, and response capacity. In the context of public finance, Rachmadina and Robinson (2025) validate the use of financial trend-monitoring models as an EWS to detect potential fiscal problems in local governments. Meanwhile, Nurasyifa and Susilawati (2024) demonstrate that EWS indicators based on quantitative parameters can be used to assess financial risk, which conceptually can be adapted to government expenditure control to provide automated signals of potential deviations. This principle aligns with Mardiasmo's (2018) perspective that effective budget control requires timely and accurate information.

From an implementation feasibility standpoint, Google Workspace—particularly Google Sheets and Google Apps Script (GAS)—offers a cloud-based platform that supports centralized databases, process automation, and cross-user access and collaboration. Rindho and Dirgahayu (2024) demonstrate that GAS as a backend and Google Sheets as a database are capable of automating accounting business processes, improving data accuracy, and reducing the burden of manual recording. Janmorga et al. (2024) show the effectiveness of GAS in developing asset management information systems that enhance tracking and reporting efficiency, while Mansor (2012) demonstrates the integration of Google Forms and Sheets to replace manual processes with more efficient and accessible online systems. Raditya et al. (2020) also show that spreadsheets are effective as recording and reporting tools that are relatively easy for users to adopt. Therefore, both conceptually and empirically, this platform is adequate as an alternative operational tool to strengthen UP control through validation mechanisms, notifications, and data traceability.

In system development, the Waterfall model is used because it provides a systematic sequential flow with documented outputs at each stage, ranging from requirements analysis, design, implementation, testing, deployment, to maintenance (Pressman, 2010; Van Casteren, 2017; Khan, 2022). Siburian and Latifah (2023) provide an example of Waterfall application in information system design that clearly emphasizes the structure of SDLC stages. Although Waterfall has limitations in terms of flexibility to changes (Sommerville, 2011), this approach remains relevant when system requirements can be adequately defined at the initial stage (Pressman, 2010; Jonasson, 2008). Based on the overall literature, the design of an EWS-embedded UP submission information system with a centralized database and automated validation has the potential to strengthen operational control, improve information accuracy, and reduce the risk of deviations and internal control weaknesses in regional financial administration.

## **RESEARCH METHOD**

### **Research Approach and Design**

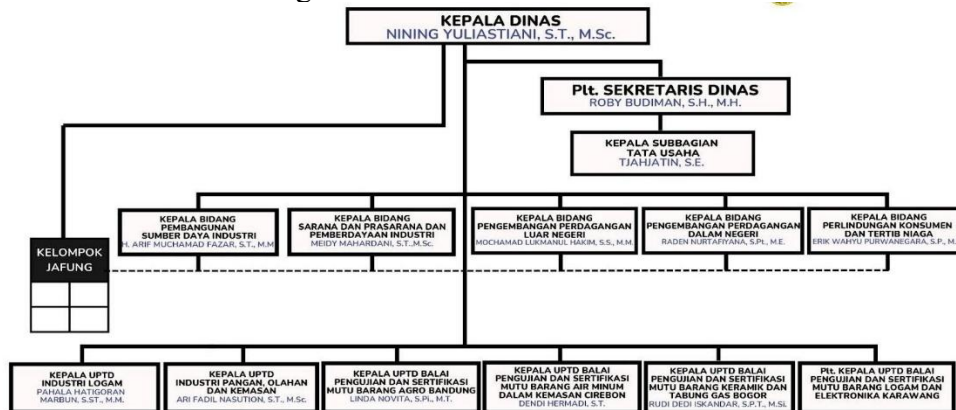
This study employs a qualitative approach with a case study design at the West Java Provincial Department of Industry and Trade. The system development method used is the Waterfall model, a sequential and linear software development life cycle (Pressman, 2010). The Waterfall method was selected because system requirements can be clearly defined at the outset, encompassing sequential stages of requirements analysis, system design, implementation, testing, deployment, and maintenance (Khan, 2022). This study focuses on the requirements analysis and system design stages to produce a prototype of an Early Warning System (EWS)-based Cash Advance (Uang Persediaan) submission information system. The research was conducted over a six-month period, beginning with field observation and analysis of the existing system, followed by the design of the proposed system, and culminating in the development of an application prototype based on Google Workspace, utilizing Google Sheets, Google Apps Script, and Google Drive as the primary development platforms.

### **Data Collection Techniques**

Data were collected using four main techniques to obtain a comprehensive understanding of the existing system. First, direct observation of the UP submission, verification, disbursement, and accountability processes was conducted, with particular attention to the activities of the Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) in preparing documents, recording transactions, and compiling recapitulations and reports to identify points that potentially cause delays or recording errors. Second, in-depth interviews were carried out with relevant stakeholders, including the BPP, Activity Technical Implementation Officers (Pejabat Pelaksana Teknis Kegiatan/PPTK), Financial Verifiers/Finance Subdivision staff, and approving authorities, to explore existing procedures, user needs, frequently encountered obstacles, and expectations regarding the proposed system. Third, documentation studies were undertaken by reviewing Standard Operating Procedures (SOPs) for UP submission, submission forms, Budget Implementation Documents (DPA) and their revisions, Cash Disbursement Plans (RPD)/Cash Budget Plans (RAK), transaction evidence, and budget realization reports. Fourth, workflow analysis was performed by mapping the entire UP submission process from start to finish to identify repetitive activities, bottleneck points, potential input errors, and unmet control requirements.

**Research Object and Location**

The object of this study is the Cash Advance (Uang Persediaan/UP) submission management system at the West Java Provincial Department of Industry and Trade. Based on West Java Governor Regulation No. 38 of 2023, the Department of Industry and Trade is tasked with assisting the Governor in carrying out governmental affairs in the fields of industry and trade, which encompass the Industrial Resources Division, Industrial Infrastructure Division, Consumer Protection and Trade Order Division, Domestic Trade Development Division, and Foreign Trade Development Division. The organizational structure of the Department of Industry and Trade is led by the Head of Department, Nining Yulastiani, S.T., M.Sc., and is supported by the Acting Secretary of the Department, Roby Budiman, S.H., M.H., who coordinates administrative affairs and internal governance. The unit that constitutes the primary focus of this research is the Administrative Subdivision, led by Tjahjatin, S.E., which provides financial services and is responsible for managing Cash Advances across the five existing technical divisions.



**Figure 1.**  
**Organizational Structure**

**Analysis of the Existing System**

The current procedure for the submission and accountability of Cash Advances (Uang Persediaan/UP) consists of three main stages. The first stage is UP submission, in which the Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) completes the submission form manually, attaches detailed expenditure requirements, and submits it to the Activity Technical Implementation Officer (Pejabat Pelaksana Teknis Kegiatan/PPTK) for approval. The process then continues to the Head of Division for the signing of an official memorandum, after which the Finance Subdivision conducts a manual verification of the remaining budget ceiling before the UP is disbursed. The second stage is the utilization of UP, during which the BPP conducts expenditure transactions in accordance with operational needs, records them manually in the general cash book, inputs transaction evidence into the Regional Government Information System (SIPD), prepares an Accountability Report (Laporan Pertanggungjawaban/LPJ) in the SIPD application which is subsequently authorized by the Head of Division, and collects and archives supporting transaction documents. The third stage is accountability, in which the BPP prepares the Accountability Statement (Surat Pertanggungjawaban/SPJ) manually along with

expenditure evidence, submits it to the Finance Subdivision for verification, the data are entered into SIPD, and the Cash Reimbursement (Ganti Uang/GU) process is carried out after the SPJ is approved.

### **Identification of Problems and Proposed Solutions**

Based on the analysis of the existing system, five critical problems were identified. First, the absence of an early warning system means that treasurers lack real-time notification mechanisms regarding remaining budget ceilings, resulting in a high risk of submissions exceeding the quarterly RAK and several instances of Expenditure Evidence (Tanda Bukti Pengeluaran/TBP) entries in SIPD being rejected due to exceeding budget limits. Second, inefficient manual processes from document receipt to reporting are time consuming, create work duplication, and make it difficult to track status because there is no centralized digital trail. Third, difficulties in monitoring and control arise due to the absence of an integrated dashboard for real-time expenditure monitoring, causing reports to be presented only periodically and potential overspending to be detected late. Fourth, there is a risk of data errors due to reliance on manual input, which opens opportunities for human error ranging from incorrect entry of amounts to format inconsistencies. Fifth, documentation issues exist whereby physical archives are prone to loss, damage, or difficulty in retrieval. To address these problems, the development of a Google Workspace based system is proposed, as it reduces investment costs, accelerates implementation, enables real-time multi-user access, facilitates collaboration and documentation, and is easily scalable according to needs, compared to standalone desktop applications or fully custom web applications that require high costs and long development times.

## **RESULTS AND DISCUSSION**

### **Proposed System Design**

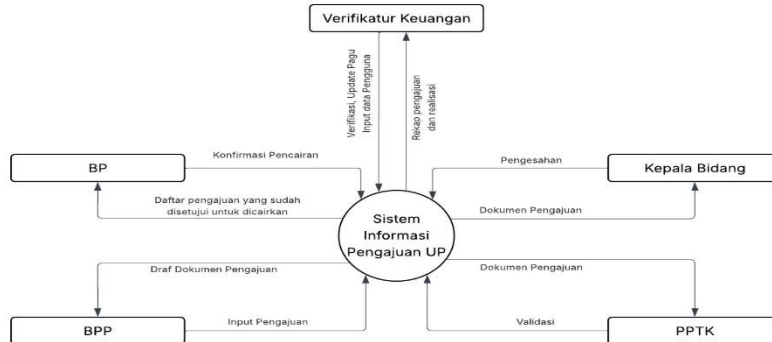
This study applies the System Development Life Cycle (SDLC) method using the Waterfall technique, as it is suitable for system development that requires structured, sequential, and well documented processes, particularly when requirements can be defined at an early stage and changes are relatively limited (Pressman, 2010). Acharya and Sahu (2020) emphasize that SDLC facilitates systematic, controlled, and project-aligned software development. The stages undertaken include requirements analysis to identify actors, business processes, and the formulation of functional and non-functional requirements, including the design of Early Warning System (EWS) rules; system design encompassing application architecture, database design (Entity Relationship Diagram), data flows (Data Flow Diagram), user interface and user experience (UI/UX) design, and internal control design; implementation through module development in accordance with the design, database creation, implementation of EWS rules, and basic security measures; testing to validate EWS rules; deployment through installation in the operational environment, account configuration, user training, and the preparation of Standard Operating Procedures (SOPs); and maintenance for bug fixing and evaluation of system effectiveness.

The proposed system procedure represents a series of processes for designing an Early Warning System-based Cash Advance (Uang Persediaan) submission information system, consisting of five main processes. First, the data processing process, in which the system retrieves budget and realization data from a centralized database to be presented on a dashboard that includes Budget Ceiling, LS Transfers, GUP Transfers, Realization, and

Remaining Budget, and performs submission recapitulation and calculates monitoring summaries in the form of This Month's Target and Remaining Submission Balance up to the current quarter. Second, the login process for user authentication and role assignment. Third, the submission process, which includes inputting new submissions, editing submissions, deleting submissions, and saving submissions for further processing. Fourth, the EWS validation process, in which the system performs automated checks against control parameters and displays warnings when submission values exceed predefined control limits. Fifth, the document printing process to generate submission recap documents as administrative outputs for verification or accountability archiving in accordance with institutional procedures.

### System Architecture and Data Flow

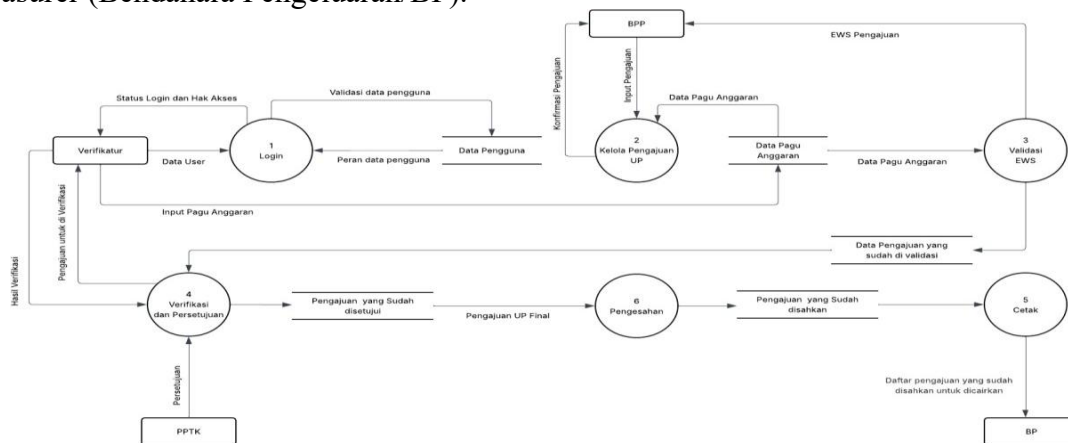
The context diagram of the proposed system illustrates the boundaries and scope of interactions between the Dashboard and Early Warning System based Cash Advance Submission Information System and the external entities involved. The Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) acts as the primary data input entity, entering UP submission data into the system. The system then processes the data into submission documents that are forwarded to the Activity Technical Implementation Officer (Pejabat Pelaksana Teknis Kegiatan/PPTK) for validation and to the Head of Division for authorization. After the submission is authorized, the system generates a list of approved submissions as the basis for the disbursement process, which is sent to the Expenditure Treasurer (Bendahara Pengeluaran/BP). The Financial Verifier interacts with the system to perform verification, update budget/ceiling data, and receive recapitulations of submissions and realizations through the dashboard for monitoring purposes.



**Figure 2.**  
**Proposed Context Diagram**

The Data Flow Diagram (DFD) of the proposed system explains the flow of data from initial input to the disbursement documents. The process begins with Login (1) to validate users and determine access rights based on User Data. Once authenticated, the Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) inputs submissions through the Manage Cash Advance (UP) Submission module (2) with reference to Budget Ceiling Data. The submission data are then examined in the EWS Validation process (3) to ensure that the submission does not exceed budget ceilings or targets, resulting in an EWS status and validated submission data. Subsequently, the validated data are processed in the Verification and Approval stage (4) by the Financial Verifier and the Activity Technical Implementation Officer (Pejabat Pelaksana Teknis Kegiatan/PPTK), producing approved

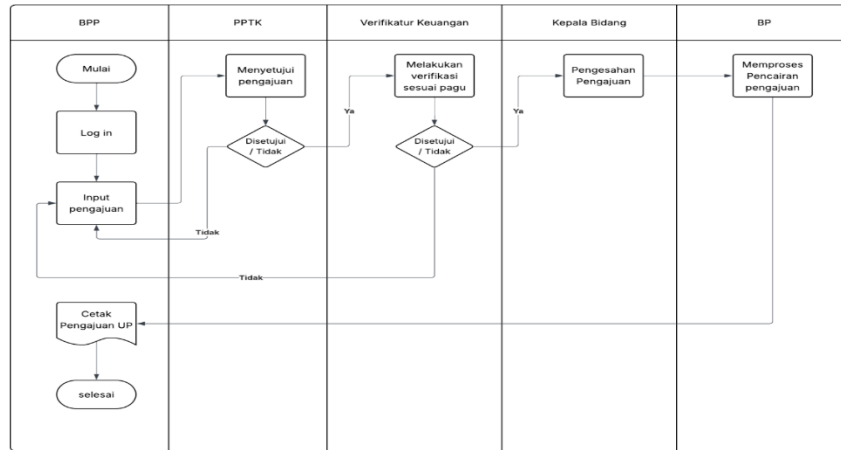
submissions. These approved submissions are then forwarded to the Authorization stage (6) to obtain an authorized status. Finally, the system performs the Printing process (5) and generates a list of authorized submissions to be disbursed as output to the Expenditure Treasurer (Bendahara Pengeluaran/BP).



**Figure 3.**  
**Proposed Data Flow Diagram**

**Proposed System Business Process Model**

The business process model of the proposed system is illustrated through a flowchart that depicts the workflow from the beginning to the end of the UP submission process. The Assistant Expenditure Treasurer (Bendahara Pengeluaran Pembantu/BPP) logs into the system to obtain role-based access, then inputs a Cash Advance (UP) submission through the dashboard by entering activity data, account codes, submission amounts, and supporting information. After the submission is entered, the system stores the data and performs EWS validation by comparing the submission amount against budget ceiling and period target data. If the EWS results indicate that the submission may exceed the allowable limits, the system issues a warning to the BPP and the submission must be revised before further processing. If the EWS validation result is safe, the submission is forwarded to the Activity Technical Implementation Officer (Pejabat Pelaksana Teknis Kegiatan/PPTK) for review and approval. Submissions approved by the PPTK are then forwarded to the Financial Verifier for verification of budget conformity and administrative completeness. Once verification is approved, the submission is forwarded to the Head of Division for authorization as the final approval. After the submission is authorized, the system generates a final submission status, and the BPP can print the UP submission documents. Subsequently, the list of authorized submissions is forwarded to the Expenditure Treasurer (Bendahara Pengeluaran/BP) to process disbursement in accordance with applicable regulations.

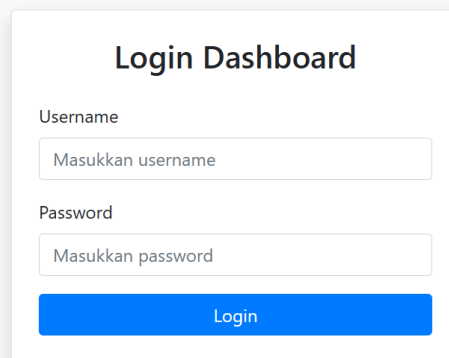


**Figure 4.**

**Proposed Business Process Flowchart**

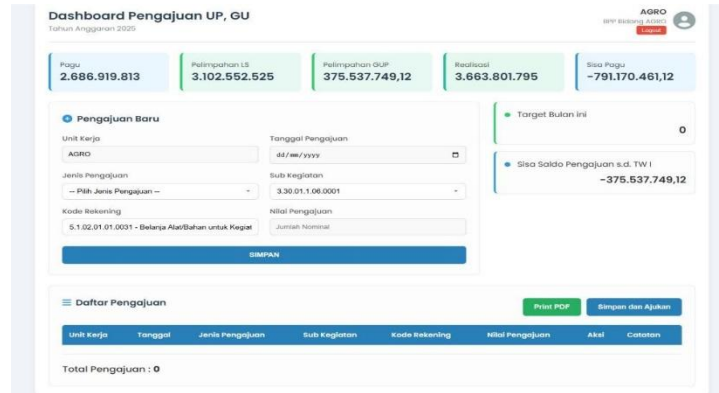
**System Interface and Specifications**

The proposed system is designed with several main interfaces to support the digital Cash Advance (Uang Persediaan/UP) submission process. The first interface is the login page, which functions for user authentication and the assignment of access rights according to each user’s role. The second interface is the UP Submission Dashboard, which presents centralized information including budget ceiling indicators, realization, remaining budget, a new submission form, a list of submissions, and a monitoring panel displaying the current month’s target and the remaining submission balance up to the current quarter. The third interface is the Cash Reimbursement (Ganti Uang/GU) Submission List, which displays a recap of GU submissions that have been processed. The fourth interface is the database view, which is used by administrators to manage budget ceiling data, Cash Disbursement Plans (RPD), user data, and system control parameters.



**Figure 5.**

**Login Information Interface**



**Figure 6.**  
**Cash Advance (UP) Submission Dashboard Interface**

					Realisasi											
					JANUARI	FEBRUARI	MARET	APRIL	MAY	JUNI	JULI	AGUSTUS	SEPTEMBER	OKTOBER	NOVEMBER	
489	AGRO	3.30.01.1.06.0001	5.1.02.01.01.0031	Belanja Alat/Bahan untuk Kegiatan Kar	10.454.986	0	0	10.269.664	0	0	0	0	0	0	0	0
490	AGRO	3.30.01.1.06.0002	5.1.02.01.01.0024	Belanja Alat/Bahan untuk Kegiatan Kar	16.783.659	0	16.721.317	0	0	0	0	0	0	0	0	0
491	AGRO	3.30.01.1.06.0002	5.1.02.01.01.0025	Belanja Alat/Bahan untuk Kegiatan Kar	12.059.945	0	12.005.482	0	0	0	0	0	0	0	0	0
492	AGRO	3.30.01.1.06.0003	5.1.02.01.01.0012	Belanja Bahan-Bahan Lainnya	2.051.280	0	0	0	0	0	0	0	0	0	0	0
493	AGRO	3.30.01.1.06.0003	5.1.02.01.01.0030	Belanja Alat/Bahan untuk Kegiatan Kar	25.709.657	0	0	528.000	0	0	0	0	0	0	0	0
494	AGRO	3.30.01.1.06.0004	5.1.02.01.01.0010	Belanja Bahan-lai Tabung Gas	6.650.075	0	720.000	0	0	240.000	0	0	0	0	240.000	0
495	AGRO	3.30.01.1.06.0004	5.1.02.01.01.0043	Belanja Natura dan Pakan-Natura	9.816.600	0	581.825	0	450.000	500.000	350.000	350.000	350.000	350.000	350.000	149.192.592
496	AGRO	3.30.01.1.06.0005	5.1.02.01.01.0026	Belanja Alat/Bahan untuk Kegiatan Kar	27.998.476	0	13.733.475	13.320.000	0	0	0	0	0	0	0	0
497	AGRO	3.30.01.1.06.0008	5.1.02.01.01.0053	Belanja Makanan dan Minuman Jamus	7.800.000	0	0	700.000	765.000	1.650.000	1.300.000	668.700	0	0	0	0
498	AGRO	3.30.01.1.06.0009	5.1.02.04.01.0001	Belanja Perjalanan Dinas Biasa	111.360.000	0	2.350.000	1.870.000	2.020.000	6.950.000	1.870.000	1.870.000	2.150.000	0	0	0
499	AGRO	3.30.01.1.06.0009	5.1.02.04.01.0004	Belanja Perjalanan Dinas Paket Measlin	525.000	0	0	0	0	0	0	0	0	0	0	0
500	AGRO	3.30.01.1.07.0005	5.2.02.05.02.0001	Belanja Modal Mebel	50.295.432	0	0	0	0	0	0	0	0	0	0	0
501	AGRO	3.30.01.1.07.0006	5.1.02.01.04.0410	Belanja Peralatan dan Measik-Computas	0	0	0	0	0	0	0	0	0	0	0	0
502	AGRO	3.30.01.1.07.0006	5.2.02.01.03.0005	Belanja Modal Pustaka	1.975.800	0	0	0	890.000	0	0	0	0	0	0	463.125.000
503	AGRO	3.30.01.1.07.0006	5.2.02.05.01.0005	Belanja Modal Alat Kantor Lainnya	43.956.000	0	0	0	20.792.998	0	0	16.206.000	0	0	0	0
504	AGRO	3.30.01.1.07.0006	5.2.02.06.01.0002	Belanja Modal Peralatan Studio Video	15.540.000	0	0	0	7.659.000	0	0	0	0	0	0	0
505	AGRO	3.30.01.1.07.0006	5.2.02.08.01.0064	Belanja Modal Unit Alat Laboratorium L	34.083.749	0	0	0	34.021.500	0	0	0	0	0	0	0
506	AGRO	3.30.01.1.07.0006	5.2.02.01.01.0002	Belanja Modal Personal Computer	22.200.000	0	0	0	0	0	0	0	0	0	0	0
507	AGRO	3.30.01.1.07.0009	5.2.03.01.01.0001	Belanja Modal Bangunan Gedung Kant	179.899.711	0	0	0	0	0	0	0	0	0	0	0
508	AGRO	3.30.01.1.07.0009	5.2.03.01.01.0013	Belanja Modal Bangunan Gedung Lant	0	0	0	0	0	0	0	0	0	0	0	0
509	AGRO	3.30.01.1.08.0002	5.1.02.02.01.0051	Belanja Jasa Pengolahan Sampah	3.350.000	0	560.000	280.000	280.000	280.000	280.000	280.000	280.000	280.000	280.000	0
510	AGRO	3.30.01.1.08.0002	5.1.02.02.01.0059	Belanja Tagihan Telepon	2.000.000	0	170.949	77.372	82.372	82.372	82.372	89.610	77.372	0	0	0
511	AGRO	3.30.01.1.08.0002	5.1.02.02.01.0061	Belanja Tagihan Listrik	145.699.680	6.405.147	5.543.230	4.524.049	4.488.359	4.694.682	4.488.359	4.488.359	5.558.186	0	0	0
512	AGRO	3.30.01.1.08.0002	5.1.02.02.01.0063	Belanja Kawat/Faksimili/Internet/TV Be	1.700.000	0	0	0	0	0	0	0	0	0	0	0
513	AGRO	3.30.01.1.08.0004	5.1.02.02.01.0015	Belanja Jasa Tenaga Laboratorium	59.277.802	0	4.402.914	13.448.742	0	4.402.914	4.402.914	4.402.914	4.402.914	0	0	0
514	AGRO	3.30.01.1.08.0004	5.1.02.02.01.0020	Belanja Jasa Tenaga Pelayanan Umum	64.175.646	0	0	10.095.006	0	0	0	0	21.361.796	0	0	0
515	AGRO	3.30.01.1.08.0004	5.1.02.02.01.0030	Belanja Jasa Tenaga Kebersihan	256.702.583	0	0	42.783.600	0	0	0	0	85.567.200	0	0	0
516	AGRO	3.30.01.1.08.0004	5.1.02.02.01.0031	Belanja Jasa Tenaga Keamanan	403.311.396	0	0	67.215.576	0	0	0	0	134.431.152	0	0	0
517	AGRO	3.30.01.1.08.0004	5.1.02.02.01.0033	Belanja Jasa Tenaga Suplai	64.512.380	0	0	10.751.936	0	0	0	0	21.563.872	0	0	0
518	AGRO	3.30.01.1.08.0004	5.1.02.02.02.0005	Belanja Iuran Jamuan Kesehatan bagi	2.151.804	0	179.317	358.634	0	179.317	179.317	179.317	179.317	179.317	0	0
519	AGRO	1.30.00.1.00.0000	6.1.03.03.03.0000	Belanja Jasa Pemeliharaan Koneksi/Instalasi Kar	7.160.000	A	10.760	70.000	A	10.760	10.760	10.760	10.760	10.760	10.760	A

**Figure 7.**  
**Database Interface**

The recommended computer system specifications for client devices (users) include a minimum Intel Core i3 processor or equivalent, at least 4 GB of memory (RAM), a minimum of 256 GB storage, a monitor with a minimum resolution of 1366 × 768, and Windows 10 or a newer operating system. For server devices, the recommended specifications include a minimum Intel Core i5 processor or equivalent, at least 8 GB of memory (RAM), a minimum 512 GB SSD storage, a Linux operating system (Ubuntu Server) or Windows Server, an Apache or Nginx web server, PHP as the programming language, MySQL as the Database Management System, and a backup system using external storage media or cloud storage. System security includes user authentication, role-based access restrictions, SSL/TLS for secure access, and periodic data backups. The system can be accessed via a Local Area Network (LAN) or the internet with a minimum speed of 10 Mbps using Google Chrome or Mozilla Firefox web browsers.

**Discussion**

The design of the Early Warning System based Cash Advance (Uang Persediaan) submission information system provides a comprehensive solution to the problems identified in the existing system. The implementation of the Waterfall method in system development

is proven to be appropriate for projects with clearly defined and structured requirements from the outset (Pressman, 2010; Khan, 2022). The sequential approach allows each stage to be well documented, from requirements analysis to system interface design. The system's main feature integrated EWS validation within the submission process represents an important innovation to prevent potential overruns of budget ceilings and quarterly RPD allocations in real time. The system also addresses the need for automation and centralized databases, as emphasized by Rindho and Dirgahayu (2024), who demonstrate the feasibility of using Google Apps Script and Google Sheets to automate business processes in accounting information systems, reducing the workload of manual recording and improving data accuracy.

The system architecture, designed using context diagrams and DFDs, clarifies data flows and interactions among entities, supporting the principles of transparency and accountability in regional financial management as mandated by Government Regulation No. 12 of 2019 and Minister of Home Affairs Regulation No. 77 of 2020. The integration of visual monitoring dashboards enables leaders and financial managers to quickly and effectively monitor remaining budgets, realization progress, and the status of UP submissions, transforming the monitoring process from reactive to proactive. This aligns with the findings of Heinrich and Probohudono (2023) and Masprayoga et al. (2023), which demonstrate that the utilization of information technology and the strengthening of Internal Control Systems have a significant positive effect on the quality of local government financial reports. The system's technical specifications adopt a web based client server architecture with SSL/TLS security standards and role-based access control, ensuring that the system operates optimally while maintaining the integrity and security of financial data. This supports the achievement of more efficient, transparent, and accountable regional financial governance.

## CONCLUSION

The design of an Early Warning System-based Cash Advance (Uang Persediaan) submission information system at the West Java Provincial Department of Industry and Trade successfully offers a comprehensive solution to financial management problems that were previously manual in nature. The implementation of the Waterfall method results in a structured system with EWS validation features capable of providing real-time automatic warnings against potential overruns of budget ceilings and quarterly RPD allocations. The integration of a visual monitoring dashboard transforms the monitoring process from reactive to proactive, enhancing efficiency, transparency, and accountability in financial administration in accordance with Government Regulation No. 12 of 2019 and Minister of Home Affairs Regulation No. 77 of 2020. The Google Workspace-based system architecture, supported by SSL/TLS security standards and role-based access control, ensures data integrity while minimizing the risk of audit findings, thereby supporting higher-quality regional financial governance.

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