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FOREWORD FROM CHAIRMAN OF APTISI

We express gratitude and warmly welcome all researchers to the APTISI Transactions on Technopreneurship (ATT) journal. This scientific journal, under the Information Planning and Technology Strategy (BSPIT) of The Association of Indonesian Private Universities (APTISI), is dedicated to disseminating high-quality academic research in the burgeoning field of technopreneurship. The scope of ATT encompasses a wide array of topics, including but not limited to Business, Management and Accounting, Computer Science, and Multidisciplinary.

In line with our 2023 vision, ATT aims to be a globally recognized journal publisher, significantly contributing to the dissemination of technopreneurship knowledge. We are committed to supporting the Ministry of Research, Technology, and Higher Education in Indonesia and adhering to the Revised Implementing Rules and Regulations (RIRR) to cultivate a generation ready for the educational revolution. ATT, a digital and Open Journal System (OJS) based publication, plays a pivotal role in this endeavor.

ATT is published thrice annually, in March, July, and November. We are dedicated to enhancing the journal's quality and are working towards indexing ATT in the Science and Technology Index (SINTA) at the national level and Scopus at the international level.

Through ATT, we aspire to advance the application and understanding of technopreneurship in education. Our goal is to provide significant benefits to the APTISI academic community and globally, fostering a deeper comprehension and appreciation of technopreneurship.

Bandung, March 2024

bit.ly/ForewordATT

M.Budi Djatmiko

Chairman Of APTISI

FOREWORD FROM HEAD EDITORIAL

In the name of God, the Most Gracious, the Most Merciful, we express our heartfelt thanks and appreciation to God for His blessings and guidance, which have enabled us to complete the publication of Volume 6, Issue 1 of the ATT Journal in March 2024. This edition serves as a valuable resource for documenting and disseminating scientific information. It assists faculty members, students, and researchers in sharing their research findings, perspectives, and scholarly studies with the broade scientific community.

This issue of the ATT Journal, focusing on the field of technopreneurship, includes 10 insightful papers and aims to be of great use to scientists and researchers everywhere. This edition features ten articles, each contributing to the expanding body of knowledge in technopreneurship. Remarkably, all articles in this issue represent original research contributions. They were authored or co-authored by a diverse group of 43 authors, hailing from 9 different countries: Indonesia, the United Kingdom, Singapore, Montenegro, Colombia, South Africa, Estonia, New Zealand, and Malaysia. This international collaboration highlights the journal's commitment to fostering global scientific communication and exchange in the realm of technopreneurship. The 10 (ten) journal published in this edition are:

1.	Rojali, Arif Sumanri, Masri Mansoer, Usep Abdul Matin	Exploring the Influence of Religious Institutions on the Implementation of Technology for Stunting Understanding
2.	Ronal Aprianto, Ade Famalika, Irma Idayati, Derli, Ihsan Nuril Hikam	Examining Influencers Role in TikTok Shop's Promotional Strategies and Consumer Purchases
3.	Blasius Erik Sibarani, Citra Anggreani, Bunga Artasya, Dhea Annisa Putri Harahap	Unraveling the Impact of Self-Efficacy, Computer Anxiety, Trait Anxiety, and Cognitive Distortions on Learning Mind Your Own Business: The Student Perspective
4.	Kepas Antoni Adrianus Manurung, Hermanto Siregar, Idqan Fahmi, Dedi Budiman Hakim	Value Chain and ESG Performance as Determinants of Sustainable Lending in Commercial Bank: A Systematic Literature Review
5.	Rusli Ginting Munthe, Marcellia Susan, Brigita Meylianti Sulungbudi	The Role of Internal Marketing in Building Organizational Commitment and Reducing Turnover Intention Affecting the Improved Performance of Life Insurance Agents in Indonesia
6.	Umi Rusilowati, Umi Narimawati, Yulia Rachma Wijayanti, Untung Rahardja, Omar Arif Al-Kamari	Optimizing Human Resource Planning through Advanced Management Information Systems: A Technological Approach
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Assoc. Prof. Dr. Ankur Singh Bist, B.Tech., M.Tech., Ph.D
Editor in Chief

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Wahyu Sejati[1*], Avelina N. B. S. Pusoko[2], Eric V. Aryadi[3], Sih Andajani[4], Dina Paramitha Anggraeni Hidayat[5], Endah Kurniyaningrum[6], Nanda Zinhle O'Connor[7]
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ABSTRACT

This study endeavors to develop a comprehensive flood routing model and ascertain dam breach parameters at the Sepaku Semoi Dam. Driven by the escalating threat of floods due to climate change and urban expansion, effective water management strategies are imperative. The increasing demand for water, juxtaposed with limited supply, underscores the pivotal role of dams in maintaining water resources, despite the inherent risks they pose in the event of failure, including loss of life, property damage, and environmental degradation. Focused on the potential causes of dam collapse, particularly overtopping and piping, this research investigates whether the Sepaku Semoi Dam has experienced overtopping through flood routing analysis, complemented by the calculation of breach parameters using the Zhong Xing HY21 model. The primary aim is to enhance understanding of flood dynamics around the dam and bolster the reliability of flood hazard predictions. Through Gap analysis, the study underscores the urgent need for improved flood risk management and understanding of dam failure potential. Employing a methodology that integrates hydrological and hydrodynamic modeling, the study aims to provide deeper insights into flood patterns around the dam and facilitate more precise calculations of dam breach parameters. The implications of this research extend to enhanced flood risk mitigation, emergency planning, and increased dam infrastructure reliability. The study's unique approach lies in its holistic integration of flood modeling and dam breach parameter calculation, which aligns with practical disaster risk management needs. Flood routing analysis indicates that the Sepaku Semoi Dam has not experienced overtopping, as evidenced by the remaining guard heights exceeding the standard guard height, while breach parameters reveal critical insights into potential dam failure scenarios.

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1. INTRODUCTION

Currently, the demand for water is increasing in every region. However, water availability is severely limited, necessitating the utilization of water resources. One effort in maintaining water resources is the health-

Preneur construction of water utilization facilities, namely dams. Dams are structures made of earth, rock, or concrete designed to store water while also serving as barriers and reservoirs for mine waste or mud (Ministry of Public Works Regulation No. 27/PRT/M/2015, 2015). Nevertheless, dams also entail the risk of flash floods, which can result in loss of life, property damage, and environmental devastation if they collapse [1], such as the catastrophic collapse of the Gintung Dam, which claimed hundreds of thousands of lives [2].

The Sepaku Semoi Dam is located in Sepaku District, North Penajam Paser Regency, East Kalimantan. The dam serves as a flood reducer and raw water supply for the Industrial Estate (IKN) at a rate of 2000 liters/second and for Balikpapan at a rate of 500 liters/second. Therefore, this analysis is conducted to determine whether the dam will experience collapse due to overtopping or not. Additionally, this analysis aims to prepare fracture parameters for use in simulating dam collapse with the Zhong Xing HY21 model [3].

2. LITERATURE REVIEW

Dam collapse can occur due to overtopping or piping. Dam collapse can lead to flash floods that can claim lives, cause property loss, and environmental damage. Dam collapse begins with the occurrence of cracks. Cracks are divided into 2 types:

1. Cracks Due to Overtopping

   Cracks due to overtopping occur when the dam cannot contain excess water, causing erosion downstream of the dam body. Cracks due to overtopping are simulated in the form of triangular, square, or trapezoidal cracks. These cracks gradually widen from the top of the dam downwards until reaching the foundation. The flow passing through the cracks is calculated as flow passing over the weir width. In the dam collapse model, cracks are assumed to develop over a certain time interval and have a final shape depending on the final base width parameter (b) and other parameters (Z) [4].

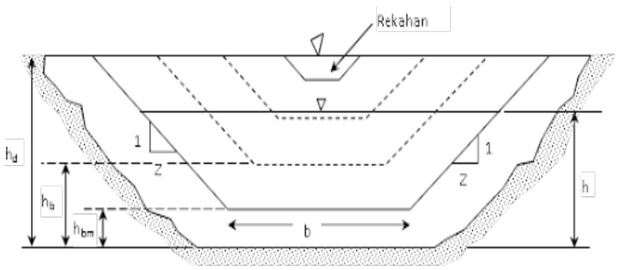

Figure 1. Illustration of Cracks Due to Overtopping

2. Fractures Due to Piping Fractures due to piping are a condition where water flows through the body of the dam or foundation. Piping can also be called a leak in the body/foundation of a dam due to reed erosion. Collapse due to piping is simulated by determining the elevation of the piping axis which is considered a rectangular hole. Generally, but not yet certain, the fracture base elevation (hbm) that will be reached after it gradually widens to a width (b) which previously started at the elevation of the fracture starting point (hf), namely the base elevation of the dam [5]. Meanwhile, the parameter value (Z) of the piping is 0 because it is square, so it has no slope [6].

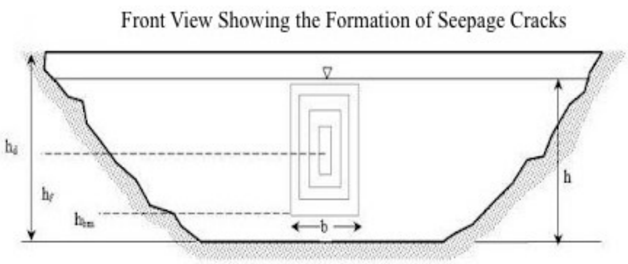

Figure 2. Illustration of Fractures Due to Piping

Dam collapse, also called dam collapse, according to PUPR Ministerial Regulation No. 27/PRT/M/2015 is defined as follows: partial or complete collapse of the dam or its additional structures; damage that causes the dam to not function; or a combination of both factors. Dams can break for a variety of reasons, and there are many potential causes. Fractures, namely holes that form in the dam body when it collapses, occur before the dam completely collapses [7]. This happened before the dam actually collapsed [8]. Understanding of failure mechanisms is still lacking, regardless of whether the dam in question is a concrete dam or an earthfill dam. The following is a reference for selecting fracture parameter values and the total time required for dam demolition for various types of dams. Performance is the result in terms of quality and quantity achieved by an employee in carrying out his duties in accordance with the responsibilities given to him [9]. Performance is about behavior or what employees do, not about what employees produce or the results of their work [10]. Performance is seen as the implementation of one's actions or abilities. Good performance is also related to the achievement of quality, quantity, cooperation, reliability, and creativity. Employee performance is considered as a measure of the quality of human resources owned by the organization [11].

Table 1. Summary of Dam Collapse Parameter Equations

Researcher	Equality
Kirkpatrick	$Q_p = 1{,}268\ (h_w+0{,}3)^{2{,}5}$
SCS	$Q_p = 16{,}6\ (h_w)^{1{,}85}$
Hagen	$Q_p = 0{,}54\ (h_d S)^{0{,}5}$
MacDonald and Langride Monopolis	$V_{er} = 0{,}0261\ (V_w h_w)^{0{,}769}$ (pile of land) $V_{er} = 0{,}00348\ (V_w h_w)^{0{,}5852}$ (non-landfill) $T_f = 0{,}0179\ (V_{er})^{0{,}364}$; $Q_p = 1{,}154\ (V_w h_w)^{0{,}41}$
Costa	$Q_p = 0{,}981\ (h_d S)^{0{,}42}$
Evan	$Q_p = 0{,}72\ (V_w)^{0{,}53}$
USBR	$B_{avg} = 3h_w$; $t_f = 0{,}011\ B_{avg}$; $Q_p = 19{,}1\ (h_w)^{1{,}85}$
Von Thun and Gilette	$B_{avg} = 2{,}5h_w + C_b$ $t_f = B_{avg}$ / $(4h_w)$ (*erosion resisiant*) $t_f = B_{avg}$ / $(4h_w + 61$ (*higly erodible*)
Froechlish	$Q_p = 0{,}607\ (V_w)^{0{,}295}\ (h_w)^{1{,}24}$
Froechlish	$B_{avg} = 0{,}1803\ K_o\ (V_w)\ 0{,}32\ (hb)$; $t_f = 0{,}00254\ (V_w)\ 0{,}53\ (h_b)^{-0{,}9}$
Walder and O'Connor	$Q_p = f$ (V_w, *relative erodibility*)
Xu and Zhang	B, Q_p ,t_f ,= f (V_w, h_w, *erodibility*)
Pierce at al.	$Q_p = 0{,}0176\ (Vh)^{0{,}606}$ or $Q_p = 0{,}0381\ V^{0{,}475} h^{1{,}09}$
Note: B = width of collapse; B_{avg} = average failure width (m); C_b = function factor of storage volume; h = water height behind the dam (m); h = collapse height (m); H_b = dam height (m); H_d = water height above the collapse (m); K_o 1.4 for overtopping and 1.0 for piping; Q_p = peak discharge (m^3/s); S = storage volume (m^3); T_f = collapse time (h); V = volume of water behind the dam; V_{er} = volume of eroded material pile (m^3); V_w volume of water passing through the top of the collapse (m^3); and z = coefficient of slope of the failure side.	

Fractures formed in earthfill dams tend to have an average width (Bbar) in the range (had Bbar 3hd) where hd is the height of the dam. This Bbar range value is proven by a summary report [12]. Therefore, the fracture width for an earthfill dam is usually much smaller than the total length of the dam measured across the valley [13]. Piping failure occurs when initial gap formation occurs at several points in the dam body caused by erosion of the dam body which causes water leakage from the dam [14]. This is because the upstream surface is slowly eroded in the early stages of piping [15]. As erosion progresses, the cracks that occur become larger so that the upper part of the dam body collapses (BOSS DAMBRK Hydrodynamic Flood Routing User's Manual) [16]. In calculating dam failure parameters, the average failure width and failure time are sought [17].

$$B\_BAR = 9,5.Ko.((Vr.hd)0,25) \tag{1}$$

$$TIME\_BF = 0,8((Vr/hd2)0,5) \tag{2}$$

Where :
B_ BAR = Average fracture width (ft)
TIME_ BF = Time of Collapse (hours)
Ko = 1.0 for piping and 1.4 for overtopping
Vr = Reservoir volume at MAB (ft3)
hd = Height of collapse (ft), height from MAB elevation to piping elevation

The Manning roughness coefficient is a figure of roughness and resistance found in the basic conditions of the channel [18][19], where this figure is able to inhibit the speed of water flow in the channel and reduce the value of the speed and flow rate. The Manning coefficient (n) for each cross section along the river downstream of the dam where the flood will pass is as follows:

Table 2. Manning coefficient

Material	Manning Coefficient (n)
Concrete	0,015
Ground Base with Edge:	
Concrete	0,017
Mortar Stone	0,02
Rip-Rap	0,023
Natural River:	
Clean, Straight Grooves	0,03
Clean, Winding	0,04
Flood Plain:	
Grassland, no Bushes, Dense Grass	0,03
Harvest Land	0,03
Dense Bushes	0,07
Dense with Trees	0,1

3. RESEARCH METHOD

The proposed research method for analyzing flood flows and calculating dam opening parameters at Sepaku Semoi Dam involves a multidisciplinary approach [20]. First, a field survey will be carried out to collect topographic data and hydrological characteristics of the river basin associated with the Sepaku Semoi Dam [21]. This data will be used as a basis for building an accurate hydrological model. Next, we will apply state-of-the-art hydrological techniques, such as the HEC-RAS model, to simulate flood flows that may result from dam failure [22] [23].

The second step involves a sensitivity analysis of the parameters that influence changes in dam conditions and the potential probability of dam rupture [24]. We will take into account various potential scenarios that affect dam strength and the hydrological characteristics of river flow, such as sudden changes in river discharge due to heavy rains or changes in topography due to natural disasters [25]. This analysis will help identify the most critical conditions that can cause dam failure [1].

The final step is model validation and verification. We will compare the simulation results with previously collected field data, including historical data on flood flows and dam conditions [26]. This validation will ensure the accuracy of the model and the reliability of the predictions produced, thereby providing a strong foundation for disaster mitigation planning and flood risk management around the Sepaku Semoi Dam [27].

This research was conducted on the Sepaku Semoi Dam which is located in North Penajam Paser Regency, East Kalimantan, at coordinates 101°13'12" East Longitude and 6°45'41" North. The territorial boundaries are as follows:

1. North: New Tengin Village
2. East: Semoi Dua Village
3. South: Semoi Dua Village, Argo Mulyo Village
4. West: Sukaraja Village

Figure 3. Location of the Sepaku Semoi Dam

The Mediapreneur data needed to carry out flood investigations is the design flood discharge data for the Sepaku Semoi Dam and the curved capacity of the Sepaku Semoi Dam reservoir [28]. Data obtained from the Kalimantan River Region IV Center. The design flood discharge for the Sepaku Semoi Dam can be seen in Table 3.

Table 3. Flood Discharge Design for the Sepaku Semoi Dam

No	Time	QPMF	Q1000	Q200	Q100	Q50	Q25	Q10	Q5	Q2
		m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
1	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2	1.00	3.30	2.70	2.50	2.50	2.50	2.40	2.30	2.30	2.20
3	2.00	4.30	3.00	2.80	2.80	2.80	2.70	2.60	2.40	2.30
4	3.00	7.00	3.10	2.90	2.90	2.80	2.80	2.70	2.50	2.40
5	4.00	13.50	3.10	2.90	2.90	2.80	2.80	2.70	2.60	2.40
6	5.00	22.60	3.10	2.90	2.90	2.80	2.80	2.70	2.60	2.50
7	6.00	68.30	6.80	4.10	3.80	3.50	3.30	3.90	2.80	2.60
8	7.00	126.30	17.70	8.80	7.20	5.30	3.90	3.30	2.90	2.60
9	8.00	174.70	30.60	16.20	13.30	9.60	6.20	4.40	3.00	2.70
10	9.00	217.00	49.50	31.70	27.20	21.40	15.40	10.70	6.20	3.60
11	10.00	353.20	65.50	46.00	65.50	65.50	40.70	26.70	12.00	6.40
12	11.00	596.90	151.50	124.90	113.20	97.40	85.90	65.40	40.40	22.10
13	12.00	1,537.50	666.60	581.40	535.90	487.40	421.90	343.70	261.00	173.70
14	13.00	1,435.90	505.10	430.10	405.40	388.00	369.00	323.20	245.50	181.60
15	14.00	1,027.80	248.90	208.20	200.00	194.60	217.70	221.50	186.20	154.00
16	15.00	696.50	145.20	115.50	109.80	99.40	118.70	134.60	132.80	116.10
17	16.00	499.90	112.00	84.40	78.90	67.80	74.10	84.90	97.00	85.40
18	17.00	395.60	02.40	75.60	70.00	60.10	57.80	61.00	73.90	63.70
19	18.00	274.20	63.20	48.10	45.30	40.70	40.40	43.00	54.40	47.30
20	19.00	155.60	40.70	33.10	31.40	28.80	30.00	31.90	40.90	36.20
21	20.00	135.70	34.70	29.10	27.60	25.30	25.80	26.20	32.40	28.90
22	21.00	115.60	32.90	28.00	26.60	24.50	24.30	23.70	27.30	24.40

23	22.00	104.10	32.40	27.70	26.30	24.40	23.80	22.70	24.20	21.50
24	23.00	99.10	32.30	27.60	26.20	24.40	23.60	22.30	22.50	19.50
25	24.00	96.00	32.30	27.60	26.20	24.40	23.60	22.20	21.40	18.40
26	25.00	52.40	27.50	25.10	22.50	21.70	20.80	19.00	18.70	16.30
27	26.00	64.30	22.60	21.70	18.30	18.00	17.90	14.40	15.10	13.30
28	27.00	45.30	20.50	20.10	13.50	13.50	14.00	10.00	11.40	10.10
29	28.00	26.10	10.10	9.60	6.40	5.50	7.70	**6.00**	7.80	7.20
30	29.00	13.50	10.10	3.80	2.90	3.00	3.90	3.60	5.40	5.10
31	30.00	7.50	3.90	2.30	2.10	2.10	2.50	2.50	3.90	3.80
32	31.00	4.50	2.30	2.00	2.00	2.00	2.10	2.10	3.00	2.90
33	32.00	3.10	2.00	2.00	2.00	2.00	2.00	2.00	2.40	2.40
34	33.00	2.50	1.90	1.90	1.90	1.90	1.90	1.90	2.10	2.20
35	34.00	2.10	1.90	1.90	1.90	1.90	1.90	1.90	2.00	2.00
36	35.00	2.00	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
37	36.00	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90

Table 4. Curved Capacity of the Sepaku Semoi Dam Reservoir

No	Elevation	Height from Base	Embung Height	Areas		Volume	
	(mdpl)	m	m	m^2	Ha	m^3	Million m^3
1	9	0	7	1,284.27	0.13	-	-
2	10	1	8	2,336.46	0.23	1,785.24	0.00
3	11	2	9	39,989.53	3.00	15,352.67	0.02
4	12	3	10	41,451.81	4.15	50,933.34	0.05
5	13	4	11	111,644.28	11.17	124,666.39	0.12
6	14	5	12	255,188.17	25.51	303,190.53	0.30
7	15	6	13	359,257.27	35.93	606,697.06	0.61
8	16	7	14	540,972.97	54.10	1,055,923.71	1.06
9	17	8	15	1,036,284.61	103.63	1,831,254.10	1.83
10	18	9	16	1,243,436.61	124.14	2,968,571.65	2.97
11	19	10	17	2,469,834.42	146.98	4,322,600.85	4.32
12	20	11	18	1,772,834.98	177.28	5,941,570.997	5.94
13	21	12	19	2,075,155.78	177.28	5,941,570.97	5,94
14	22	13	20	2,325,185.78	207.52	7,663,598.57	7.86
15	23	14	21	2,668,796.66	266.88	12,557,552.13	12.56
16	24	15	22	2,923,279.75	292.33	15,352,624.75	15.35
17	25	16	23	3,149,391.55	314.94	18,388,258.07	18.39
18	26	17	24	3,353,963.31	335.40	21,639,398.60	21.64
19	27	18	25	3,918,878.77	391.89	25,272,157.6048	25.27

The following is technical data for the Sepaku Semoi Dam obtained from the Kalimantan IV River Regional Office.

3.1. Dam Body (Main Dam)

Type = Homogeneous Soil Fill
El. Dam Base = +9.0 El.m
El. Dam Peak = +27.0 El.m

Dam length = 450 m
Dam height = 18 m
Width of Dam Peak = 7 m
Upstream Slope Slope = 1:3
Downstream Slope Slope = 1:3

3.2. Spillway Building

Spillway Type = Side Spillway
Threshold Type = Free Overflow (Ogee)
El. Peak = +22.0 El.m
Spillway Width = 40 m

4. RESULT AND DISCUSSION

4.1. Flood Search

Flood tracing is carried out to calculate the maximum water level of the reservoir [29]. This is done to determine the most cost-effective (optimal) height of the dam but remains safe from the risk of flooding. The basic formula chosen is:

$$I - O = \frac{ds}{dt} \tag{3}$$

with :
I = Reservoir inflow (m^3/sec)
O = Reservoir outflow (m^3/sec)
$\frac{ds}{dt}$ = Water discharge held in a reservoir for a short period of time

$$Jika, dt = \Delta t \rightarrow I = \frac{1_1 + 1_2}{2} \tag{4}$$

$$Q = \frac{Q_1 + Q_2}{2} \tag{5}$$

$$ds = S_2 - S_1 \tag{6}$$

So, the equation can be written as:

$$\frac{1_1 + 1_2}{2} S_2 - S_1 \tag{7}$$

This equation can be changed to the following:

$$\frac{1_1 + 1_2}{2} + [\frac{S_1}{\Delta t} - \frac{Q_2}{2}] = [\frac{S_2}{\Delta t} - \frac{Q_2}{2}] \tag{8}$$

With :
S_1 = Reservoir storage at the start of the tracking period (measured from the top of the spillway structure/tunnel axis)
Q_2 = The debit that occurs at the start of the tracking period

4.2. Flow on the Spillway

A spillway is a building used to overflow water that cannot be accommodated by a dam. To determine the dimensions of the spillway, it is adjusted to the 1000 year return period discharge (Q1000) and must be able to pass the maximum flood discharge (QPMF) without experiencing overtopping [30]. Calculation of discharge through the spillway uses the following formula:

$$Q = C : L : H^{\frac{3}{2}} \tag{9}$$

$$Cd = 2,2 - 0,0416(H\_d/P)^{0,99} \tag{10}$$

$$C = 1,6(1 + 2a(h/H\_d))/(1 + a(h/H\_d)) \tag{11}$$

Where :
Q = Discharge (m^3/sec)
C = Spillover coefficient
Cd = Overflow coefficient when h = H_ d
L = Effective width of spillway (m)
H = Difference in water surface elevation of the reservoir and Mercu (m)
P = Height of the spillway from the apron (m)
A = Constant

The magnitude of the overflow discharge coefficient (C) of a standard type of dam can also be obtained using the Iwasaki formula as follows:

$$Cd = 2,20–0,0,416(Hd/W)^{0,99} \tag{12}$$

$$C = 1,60(1 + 2ah/Hd)/(1 + ah/Hd) \tag{13}$$

Information :
C = Overflow discharge coefficient
Cd = Overflow discharge coefficient when h = Hd
H = Water height above the spillway beacon (m)
Hd = Design pressure height above the weir beacon (m)
W = Weir height (m)
α = Coefficient value when h = Hd so that C = Cd

4.3. Reservoir Capacity Curve

The flood discharge data used is 1000 year return period flood discharge data (Q1000) and PMF flood discharge (QPMF) [31]. To determine the maximum flood discharge, you need to take the largest discharge value from each return period [32]. Thus, the maximum design discharge of the Q1000 is 666,600 m^3/s. Meanwhile, the QPMF is 1,537.50 m^3/s. The curved graph of reservoir capacity can be seen in Fig 4.

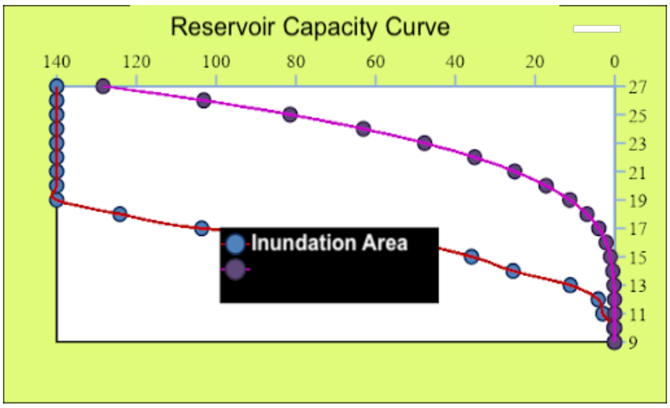

Figure 4. Curved Graph of the Reservoir Capacity of the Sepaku Semoi Dam

4.4. Flood Tracing Through Spillways

This is done to find out whether the dam is experiencing overtopping or not. The flood discharge used is the Q1000 and QPMF flood discharge [33]. The basis for calculating flood tracking uses data as below. Data:

Spillway Width (B) = 40 m
C initially = 2,117
Overflow Threshold Height (W) = 2 m
Spillway Peak Elevation = 22.00 m
Dam Peak Elevation = 27.00 m
Q1000th = 666.6 m^3/sec
QPMF = 1537.5 m^3/sec

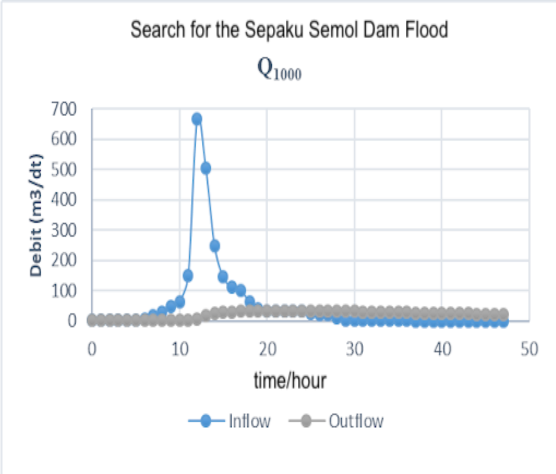

Figure 5. Inflow Outflow Relationship Graph on the Spillway

It is known that the largest abundant discharge is 666,600 m^3/sec at an elevation of +22,636 m, while the dam peak elevation is +27.00 m so there is a difference where the water surface elevation is lower than the dam peak elevation of 4,364 m [34].

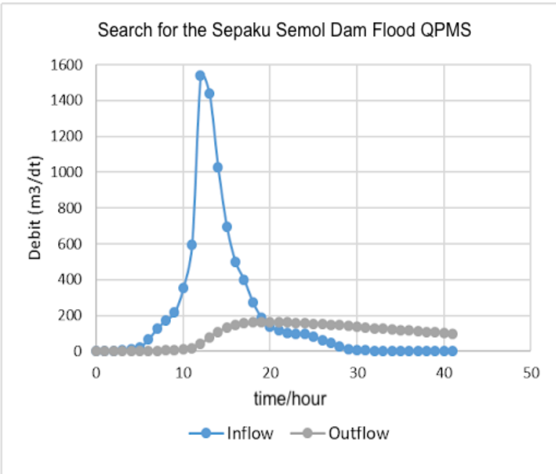

Figure 6. QPMF Inflow Outflow Relationship Graph on the Spillway

It is known that the largest abundant discharge is 1537.5 m^3/sec at an elevation of +23,785 m, while the elevation of the dam top is +27.00 m so it has a remaining buffer of 3,215 m. The remaining guard height is in accordance with the guard height standard, namely >0.75 m for PMF flood conditions with spillways without gates. This proves that the Sepaku Semoi Dam does not experience overtopping [35].

4.5. Parameter Calculation

Based on flood investigations that have been carried out, the Sepaku Semoi Dam does not experience overtopping so the parameter calculations carried out are only for the piping scenario [36]. The piping scenario parameters used include top, middle and bottom piping. This parameter is used in the Zhong Xing HY21 program input [37].

Table 5. Fracture Parameters

Scenario	Flood Water Level			Item
	Upper Piping	*Middle Piping*	*Basic Piping*	
	Scenario 1	Scenario 2	Scenario 3	
Upper Boundary	As Dam	As Dam	As Dam	-
Lower Boundary	Downstream	Downstream	Downstream	-
Elv. Crest Dam	27	27	27	m
Dam Length	450	450	450	m
Elv. MAB	22.19	22.19	22.19	m
Spillway Width	40	40	40	m
Elv. Crest Spillway	22	22	22	m
H_Fail	25.19	25.19	25.19	m
H_BM	9	9	9	m
B_BAR	57.46	75.63	85.93	m
Time_BF	11.96	3.99	2.39	hour
	43059.91	14353.30	8611.98	s
H_PIPE	22.492	17.095	11.698	m
Q_{inflow} *PMF*	1537.5	1537.5	1537.5	m^2/s

The following is an explanation of the input for the Padan dam collapse simulation for the Sepaku Semoi Dam:

1. Elevation of the dam crest (m) is the elevation of the dam crest.
2. Reservoir width at the dam (m) is the width of the dam.
3. Initial reservoir water surface elevation (m) is the elevation where the initial reservoir water level was when it collapsed.
4. Discharge coef. for flow over the dam crest (m0.5/s) is coefficient whose value range is 1.38 - 2.21.
5. Uncontrolled spillway width (m) is the width of the spillway.
6. Uncontrolled spillway crest elevation (m) is the elevation of the spillway crest.
7. Uncontrolled spillway discharge coef. (m0.5/s) is a coefficient whose value is 1.38 - 2.21.
8. H_ FAIL is the elevation of the reservoir water level when the dam is destroyed.
9. H_ BM is the elevation of the reservoir base when the dam will start to collapse.
10. B-BAR is the average fracture width according to Freolich.
11. TIME_ BF is the time of collapse according to Freolich.
12. H_ PIPE is the piping elevation of the initial center of failure which is only found in the piping simulation scenario.

5. CONCLUSION

Based on the analysis of the simulation of the collapse of the Sepaku Semoi Dam, the following conclusions were drawn: The Sepaku Semoi Dam did not collapse due to overtopping. At the Q_{1000}-year flood discharge, which was the largest overflow, reaching 666.600 m^3/sec at an elevation of +22.636 m with a freeboard of 4.364 m, and at the peak maximum flood (QPMF) with a discharge of 1537.5 m^3/sec at an elevation of +23.785 m with a freeboard of 3.215 m, neither resulted in overtopping because the peak elevation of the Sepaku Semoi Dam is +27 m, ensuring that the freeboard exceeded the standard requirement of 0.75 m.

Furthermore, through the calculation of crack parameters, it was found that the average collapse widths for upper piping were 57.46 m, middle piping were 75.63 m, and bottom piping were 85.93 m. The collapse durations for upper piping were calculated to be 11.96 hours, middle piping 3.99 hours, and bottom piping 2.39 hours. These data provide further insight into the potential collapse process of the dam under certain conditions.

Thus, this analysis provides a deeper understanding of the contributing factors to dam collapse and reinforces the understanding of the structural integrity of the Sepaku Semoi Dam in facing extreme flood loads. Although it did not collapse due to overtopping during the simulation, detailed understanding of collapse parameters is important for future planning and risk mitigation.

6. DECLARATIONS

6.1. Author Contributions

Conceptualization: W.J.; Methodology: A.N.B.S.P.; Software: E.V.A.; Validation: W.J. and A.N.B.S.P.; Formal Analysis: S.A. and D.P.A.H.; Investigation: W.J.; Resources: A.N.B.S.P.; Data Curation: A.N.B.S.P.; Writing Original Draft Preparation: E.K. and N.Z.O.; Writing Review and Editing: E.K. and N.Z.O.; Visualization: A.N.B.S.P.; All authors, W.J., A.N.B.S.P., E.V.A., S.A., D.P.A.H., E.K. and N.Z.O., have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

[1] D. S. S. Wuisan, R. A. Sunardjo, Q. Aini, N. A. Yusuf, and U. Rahardja, "Integrating artificial intelligence in human resource management: A smartpls approach for entrepreneurial success," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 334–345, 2023.

[2] B. Rawat, A. S. Bist, B. S. Riza, A. Oktariyani, and U. Rahardja, "Analysis of examination process during covid and post covid in indian context," in *2021 9th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2021, pp. 1–5.

[3] S. G. Aniskurlillah, R. Asmaranto, and P. T. Juwono, "Analisa keruntuhan bendungan muka kuning batam menggunakan aplikasi zhong xing hy21," *vol*, vol. 28, pp. 1286–1290, 2018.

[4] L. M. Limantara and T. Juowono, "Flood behavior analysis due to dam break (case study in cengklik dam, center java of indonesia)," *International Journal of Emerging Technology and Advanced Engineering*, vol. 2, no. 11, pp. 3–4, 2012.

[5] P. A. Sunarya, U. Rahardja, S. C. Chen, Y.-M. Lic, and M. Hardini, “Deciphering digital social dynamics: A comparative study of logistic regression and random forest in predicting e-commerce customer behavior,” *Journal of Applied Data Sciences*, vol. 5, no. 1, pp. 100–113, 2024.

[6] H. Chen and J. Ren, “The effect of influencer persona on consumer decision-making towards short-form video ads—from the angle of narrative persuasion,” in *International Conference on Human-Computer Interaction*. Springer, 2022, pp. 223–234.

[7] F. Serafini and S. F. Reid, “Multimodal content analysis: expanding analytical approaches to content analysis,” *Visual Communication*, vol. 22, no. 4, pp. 623–649, 2023.

[8] Z. Cheng and Y. Li, “Like, comment, and share on tiktok: Exploring the effect of sentiment and second-person view on the user engagement with tiktok news videos,” *Social Science Computer Review*, vol. 42, no. 1, pp. 201–223, 2024.

[9] A. Pambudi, N. Lutfiani, M. Hardini, A. R. A. Zahra, and U. Rahardja, “The digital revolution of startup matchmaking: Ai and computer science synergies,” in *2023 Eighth International Conference on Informatics and Computing (ICIC)*. IEEE, 2023, pp. 1–6.

[10] J. Feldkamp, “The rise of tiktok: The evolution of a social media platform during covid-19,” *Digital responses to Covid-19: Digital innovation, transformation, and entrepreneurship during pandemic outbreaks*, pp. 73–85, 2021.

[11] K. Mirdad, O. P. M. Daeli, N. Septiani, A. Ekawati, and U. Rusilowati, “Optimizing student engagement and performance usingai-enabled educational tools,” *CORISINTA*, vol. 1, no. 1, pp. 53–60, 2024.

[12] M. Yusup, E. Sukmawati, R. Ramadhan, and M. I. Suhaepi, “Blockchain technology for cashless investments and transactions in digital era with swot approach,” *Blockchain Frontier Technology*, vol. 2, no. 1, pp. 17–23, 2022.

[13] A. R. Thurik, D. B. Audretsch, J. H. Block, A. Burke, M. A. Carree, M. Dejardin, C. A. Rietveld, M. Sanders, U. Stephan, and J. Wiklund, “The impact of entrepreneurship research on other academic fields,” *Small Business Economics*, pp. 1–25, 2023.

[14] Q. Aini, I. Handayani, and F. H. N. Lestari, “Utilization of scientific publication media to improve the quality of scientific work,” *APTISI Transactions on Management*, vol. 4, no. 1, pp. 1–12, 2020.

[15] K. Symons, I. Vanwesenbeeck, M. Walrave, J. Van Ouytsel, and K. Ponnet, “Parents’ concerns over internet use, their engagement in interaction restrictions, and adolescents’ behavior on social networking sites,” *Youth & Society*, vol. 52, no. 8, pp. 1569–1581, 2020.

[16] C. Lukita, M. Hardini, S. Pranata, D. Julianingsih, and N. P. L. Santoso, “Transformation of entrepreneurship and digital technology students in the era of revolution 4.0,” *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 291–304, 2023.

[17] A. N. Mufiidah and R. D. Destiani, “The benefits, challenges, and future of blockchain and the internet of things,” *Blockchain Frontier Technology*, vol. 3, no. 1, pp. 13–25, 2023.

[18] B. Aulet, *Disciplined Entrepreneurship Expanded & Updated: 24 Steps to a Successful Startup*. John Wiley & Sons, 2024.

[19] G. Ravi, M. F. Nur, and A. Kiswara, “Analyzing changes in traditional industries: Challenges and opportunities in the e-commerce era,” *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 5, no. 1, pp. 39–49, 2023.

[20] Y. Pan, S. Zhang, and M. Zhang, “The impact of entrepreneurship of farmers on agriculture and rural economic growth: Innovation-driven perspective,” *Innovation and Green Development*, vol. 3, no. 1, p. 100093, 2024.

[21] P. Luo, M. Luo, F. Li, X. Qi, A. Huo, Z. Wang, B. He, K. Takara, D. Nover, and Y. Wang, "Urban flood numerical simulation: Research, methods and future perspectives," *Environmental Modelling & Software*, vol. 156, p. 105478, 2022.

[22] V. V. Febiandini and M. S. Sony, "Analysis of public administration challenges in the development of artificial intelligence industry 4.0," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 2, pp. 164–168, 2023.

[23] S. Vedula, C. Doblinger, D. Pacheco, J. G. York, S. Bacq, M. V. Russo, and T. J. Dean, "Entrepreneurship for the public good: A review, critique, and path forward for social and environmental entrepreneurship research," *Academy of Management Annals*, vol. 16, no. 1, pp. 391–425, 2022.

[24] B. Rawat and D. Maulidditya, "Entrepreneurship in information technology as a method for improving student creativity in the digital economy," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 1, pp. 32–37, 2022.

[25] R. G. Holcombe, "Engineering is not entrepreneurship," *Moonshots and the New Industrial Policy: Questioning the Mission Economy*, pp. 43–60, 2024.

[26] R. Tarmizi, N. Septiani, P. A. Sunarya, and Y. P. A. Sanjaya, "Harnessing digital platforms for entrepreneurial success: A study of technopreneurship trends and practices," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 278–290, 2023.

[27] N. Sikki, Z. Aripin, and N. G. Fitrianti, "Business innovation and critical success factors in digital transformation and challenging times: An econometric analysis of startup viability and success," *KRIEZ ACADEMY: Journal of development and community service*, vol. 1, no. 2, pp. 1–15, 2024.

[28] S. Alateeg, A. Alhammadi, S. I. Al-Ayed, and M. A. Helmi, "Factors influencing on behavioral intention to adopt artificial intelligence for startup sustainability," *Kurdish Studies*, vol. 12, no. 1, pp. 2924–2941, 2024.

[29] L. Bzhalava, J. Kaivo-oja, and S. S. Hassan, "Digital business foresight: Keyword-based analysis and corex topic modeling," *Futures*, vol. 155, p. 103303, 2024.

[30] M. Gruber and S. Tal, "Reflecting on the creation of the market opportunity navigator (4th tool in the lean startup)," *Journal of Business Venturing Design*, vol. 3, p. 100017, 2024.

[31] W. Rusdi, W. Firmansyah, and H. Tahir, "Mosque-based economic development over a decade with bibliometric review analysis," *Jurnal Ilmu Ekonomi dan Bisnis Islam*, vol. 5, no. 2, pp. 172–186, 2023.

[32] A. S. Bist, "The importance of building a digital business startup in college," *Startupreneur Business Digital (SABDA Journal)*, vol. 2, no. 1, pp. 31–42, 2023.

[33] H. Yanfika and N. Nurdiana, "Model of accreditation caceleration for international reputable journals," *Open Global Scientific Journal*, vol. 2, no. 2, pp. 66–80, 2023.

[34] M. D. Schultz and P. Seele, "Towards ai ethics' institutionalization: knowledge bridges from business ethics to advance organizational ai ethics," *AI and Ethics*, vol. 3, no. 1, pp. 99–111, 2023.

[35] C. M. R. de Magalhães, "Corporate social responsibility, business ethics, sustainability, and innovation: a theoretical analysis of the importance of these concepts in times of pandemic," in *Innovation and Sustainable Manufacturing*. Elsevier, 2023, pp. 151–178.

[36] E. Dollan, B. D. K. Ramadhan *et al.*, "Assessing the outcomes of circular economy and waste management partnerships between indonesia and denmark," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 5, no. 1, pp. 76–83, 2023.

[37] I. Sitaridis and F. Kitsios, "Digital entrepreneurship and entrepreneurship education: a review of the literature," *International Journal of Entrepreneurial Behavior & Research*, vol. 30, no. 2/3, pp. 277–304, 2024.

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Flood Routing and Dam Breach Parameter Calculation on Sepaku Semoi Dam

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ABSTRACT

This study endeavors to develop a comprehensive flood routing model and ascertain dam breach parameters at the Sepaku Semoi Dam. Driven by the escalating threat of floods due to climate change and urban expansion, effective water management strategies are imperative. The increasing demand for water, juxtaposed with limited supply, underscores the pivotal role of dams in maintaining water resources, despite the inherent risks they pose in the event of failure, including loss of life, property damage, and environmental degradation. Focused on the potential causes of dam collapse, particularly overtopping and piping, this research investigates whether the Sepaku Semoi Dam has experienced overtopping through flood routing analysis, complemented by the calculation of breach parameters using the Zhong Xing HY21 model. The primary aim is to enhance understanding of flood dynamics around the dam and bolster the reliability of flood hazard predictions. Through Gap analysis, the study underscores the urgent need for improved flood risk management and understanding of dam failure potential. Employing a methodology that integrates hydrological and hydrodynamic modeling, the study aims to provide deeper insights into flood patterns around the dam and facilitate more precise calculations of dam breach parameters. The implications of this research extend to enhanced flood risk mitigation, emergency planning, and increased dam infrastructure reliability. The study's unique approach lies in its holistic integration of flood modeling and dam breach parameter calculation, which aligns with practical disaster risk management needs. Flood routing analysis indicates that the Sepaku Semoi Dam has not experienced overtopping, as evidenced by the remaining guard heights exceeding the standard guard height, while breach parameters reveal critical insights into potential dam failure scenarios.

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1. INTRODUCTION

Currently, the demand for water is increasing in every region. However, water availability is severely limited, necessitating the utilization of water resources. One effort in maintaining water resources is the health-

Preneur construction of water utilization facilities, namely dams. Dams are structures made of earth, rock, or concrete designed to store water while also serving as barriers and reservoirs for mine waste or mud (Ministry of Public Works Regulation No. 27/PRT/M/2015, 2015). Nevertheless, dams also entail the risk of flash floods, which can result in loss of life, property damage, and environmental devastation if they collapse [1], such as the catastrophic collapse of the Gintung Dam, which claimed hundreds of thousands of lives [2].

The Sepaku Semoi Dam is located in Sepaku District, North Penajam Paser Regency, East Kalimantan. The dam serves as a flood reducer and raw water supply for the Industrial Estate (IKN) at a rate of 2000 liters/second and for Balikpapan at a rate of 500 liters/second. Therefore, this analysis is conducted to determine whether the dam will experience collapse due to overtopping or not. Additionally, this analysis aims to prepare fracture parameters for use in simulating dam collapse with the Zhong Xing HY21 model [3].

2. LITERATURE REVIEW

Dam collapse can occur due to overtopping or piping. Dam collapse can lead to flash floods that can claim lives, cause property loss, and environmental damage. Dam collapse begins with the occurrence of cracks. Cracks are divided into 2 types:

1. Cracks Due to Overtopping

   Cracks due to overtopping occur when the dam cannot contain excess water, causing erosion downstream of the dam body. Cracks due to overtopping are simulated in the form of triangular, square, or trapezoidal cracks. These cracks gradually widen from the top of the dam downwards until reaching the foundation. The flow passing through the cracks is calculated as flow passing over the weir width. In the dam collapse model, cracks are assumed to develop over a certain time interval and have a final shape depending on the final base width parameter (b) and other parameters (Z) [4].

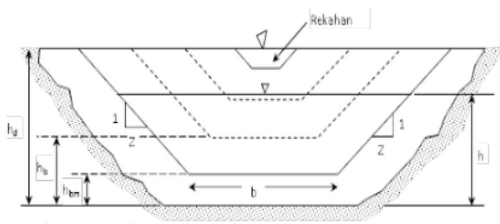

Figure 1. Illustration of Cracks Due to Overtopping

2. Fractures Due to Piping Fractures due to piping are a condition where water flows through the body of the dam or foundation. Piping can also be called a leak in the body/foundation of a dam due to reed erosion. Collapse due to piping is simulated by determining the elevation of the piping axis which is considered a rectangular hole. Generally, but not yet certain, the fracture base elevation (hbm) that will be reached after it gradually widens to a width (b) which previously started at the elevation of the fracture starting point (hf), namely the base elevation of the dam [5]. Meanwhile, the parameter value (Z) of the piping is 0 because it is square, so it has no slope [6].

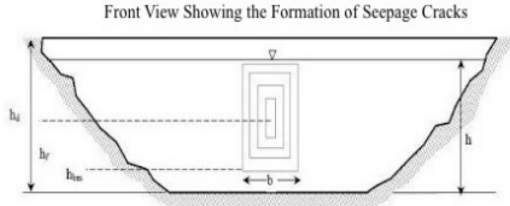

Figure 2. Illustration of Fractures Due to Piping

Dam collapse, also called dam collapse, according to PUPR Ministerial Regulation No. 27/PRT/M/2015 is defined as follows: partial or complete collapse of the dam or its additional structures; damage that causes the dam to not function; or a combination of both factors. Dams can break for a variety of reasons, and there are many potential causes. Fractures, namely holes that form in the dam body when it collapses, occur before the dam completely collapses [7]. This happened before the dam actually collapsed [8]. Understanding of failure mechanisms is still lacking, regardless of whether the dam in question is a concrete dam or an earthfill dam. The following is a reference for selecting fracture parameter values and the total time required for dam demolition for various types of dams. Performance is the result in terms of quality and quantity achieved by an employee in carrying out his duties in accordance with the responsibilities given to him [9]. Performance is about behavior or what employees do, not about what employees produce or the results of their work [10]. Performance is seen as the implementation of one's actions or abilities. Good performance is also related to the achievement of quality, quantity, cooperation, reliability, and creativity. Employee performance is considered as a measure of the quality of human resources owned by the organization [11].

Table 1. Summary of Dam Collapse Parameter Equations

Researcher	Equality
Kirkpatrick	$Q_p = 1{,}268\ (h_w{+}0{,}3)^{2{,}5}$
SCS	$Q_p = 16{,}6\ (h_w)^{1{,}85}$
Hagen	$Q_p = 0{,}54\ (h_d S)^{0{,}5}$
MacDonald and Langride Monopolis	$V_{er} = 0{,}0261\ (V_w h_w)^{0{,}769}$ (pile of land) $V_{er} = 0{,}00348\ (V_w h_w)^{0{,}5852}$ (non-landfill) $T_f = 0{,}0179\ (V_{er})^{0{,}364}$; $Q_p = 1{,}154\ (V_w h_w)^{0{,}41}$
Costa	$Q_p = 0{,}981\ (h_d S)^{0{,}42}$
Evan	$Q_p = 0{,}72\ (V_w)^{0{,}53}$
USBR	$B_{avg} = 3h_w$; $t_f = 0{,}011\ B_{avg}$; $Q_p = 19{,}1\ (h_w)^{1{,}85}$
Von Thun and Gilette	$B_{avg} = 2{,}5h_w + C_b$ $t_f = B_{avg} / (4h_w)$ (*erosion resisiant*) $t_f = B_{avg} / (4h_w + 61$ (*higly erodible*)
Froechlish	$Q_p = 0{,}607\ (V_w)^{0{,}295}\ (h_w)^{1{,}24}$
Froechlish	$B_{avg} = 0{,}1803\ K_o\ (V_w)\ 0{,}32$ (hb); $t_f = 0{,}00254\ (V_w)\ 0{,}53\ (h_b)^{-0{,}9}$
Walder and O'Connor	$Q_p = f\ (V_w,$ *relative erodibility*$)$
Xu and Zhang	B, Q_p ,t_f ,= f (V_w, h_w, *erodibility*)
Pierce at al.	$Q_p = 0{,}0176\ (Vh)^{0{,}606}$ or $Q_p = 0{,}0381\ V^{0{,}475} h^{1{,}09}$

Note: B = width of collapse; B_{avg} = average failure width (m); C_b = function factor of storage volume; h = water height behind the dam (m); h = collapse height (m); H_b = dam height (m); H_d = water height above the collapse (m); K_o 1.4 for overtopping and 1.0 for piping; Q_p = peak discharge (m^3/s); S = storage volume (m^3); T_f = collapse time (h); V = volume of water behind the dam; V_{er} = volume of eroded material pile (m^3); V_w volume of water passing through the top of the collapse (m^3); and z = coefficient of slope of the failure side.

Fractures formed in earthfill dams tend to have an average width (Bbar) in the range (had Bbar 3hd) where hd is the height of the dam. This Bbar range value is proven by a summary report [12]. Therefore, the fracture width for an earthfill dam is usually much smaller than the total length of the dam measured across the valley [13]. Piping failure occurs when initial gap formation occurs at several points in the dam body caused by erosion of the dam body which causes water leakage from the dam [14]. This is because the upstream surface is slowly eroded in the early stages of piping [15]. As erosion progresses, the cracks that occur become larger so that the upper part of the dam body collapses (BOSS DAMBRK Hydrodynamic Flood Routing User's Manual) [16]. In calculating dam failure parameters, the average failure width and failure time are sought [17].

$$B\_BAR = 9,5.Ko.((Vr.hd)0,25) \quad (1)$$

$$TIME\_BF = 0,8((Vr/hd2)0,5) \quad (2)$$

Where :
B_ BAR = Average fracture width (ft)
TIME_ BF = Time of Collapse (hours)
Ko = 1.0 for piping and 1.4 for overtopping
Vr = Reservoir volume at MAB (ft3)
hd = Height of collapse (ft), height from MAB elevation to piping elevation

The Manning roughness coefficient is a figure of roughness and resistance found in the basic conditions of the channel [18][19], where this figure is able to inhibit the speed of water flow in the channel and reduce the value of the speed and flow rate. The Manning coefficient (n) for each cross section along the river downstream of the dam where the flood will pass is as follows:

Table 2. Manning coefficient

Material	Manning Coefficient (n)
Concrete	0,015
Ground Base with Edge:	
Concrete	0,017
Mortar Stone	0,02
Rip-Rap	0,023
Natural River:	
Clean, Straight Grooves	0,03
Clean, Winding	0,04
Flood Plain:	
Grassland, no Bushes, Dense Grass	0,03
Harvest Land	0,03
Dense Bushes	0,07
Dense with Trees	0,1

3. RESEARCH METHOD

The proposed research method for analyzing flood flows and calculating dam opening parameters at Sepaku Semoi Dam involves a multidisciplinary approach [20]. First, a field survey will be carried out to collect topographic data and hydrological characteristics of the river basin associated with the Sepaku Semoi Dam [21]. This data will be used as a basis for building an accurate hydrological model. Next, we will apply state-of-the-art hydrological techniques, such as the HEC-RAS model, to simulate flood flows that may result from dam failure [22] [23].

The second step involves a sensitivity analysis of the parameters that influence changes in dam conditions and the potential probability of dam rupture [24]. We will take into account various potential scenarios that affect dam strength and the hydrological characteristics of river flow, such as sudden changes in river discharge due to heavy rains or changes in topography due to natural disasters [25]. This analysis will help identify the most critical conditions that can cause dam failure [1].

The final step is model validation and verification. We will compare the simulation results with previously collected field data, including historical data on flood flows and dam conditions [26]. This validation will ensure the accuracy of the model and the reliability of the predictions produced, thereby providing a strong foundation for disaster mitigation planning and flood risk management around the Sepaku Semoi Dam [27].

This research was conducted on the Sepaku Semoi Dam which is located in North Penajam Paser Regency, East Kalimantan, at coordinates 101°13'12" East Longitude and 6°45'41" North. The territorial boundaries are as follows:

1. North: New Tengin Village
2. East: Semoi Dua Village
3. South: Semoi Dua Village, Argo Mulyo Village
4. West: Sukaraja Village

Figure 3. Location of the Sepaku Semoi Dam

The Mediapreneur data needed to carry out flood investigations is the design flood discharge data for the Sepaku Semoi Dam and the curved capacity of the Sepaku Semoi Dam reservoir [28]. Data obtained from the Kalimantan River Region IV Center. The design flood discharge for the Sepaku Semoi Dam can be seen in Table 3.

Table 3. Flood Discharge Design for the Sepaku Semoi Dam

No	Time	QPMF	Q1000	Q200	Q100	Q50	Q25	Q10	Q5	Q2
		m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s	m/s
1	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2	1.00	3.30	2.70	2.50	2.50	2.50	2.40	2.30	2.30	2.20
3	2.00	4.30	3.00	2.80	2.80	2.80	2.70	2.60	2.40	2.30
4	3.00	7.00	3.10	2.90	2.90	2.80	2.80	2.70	2.50	2.40
5	4.00	13.50	3.10	2.90	2.90	2.80	2.80	2.70	2.60	2.40
6	5.00	22.60	3.10	2.90	2.90	2.80	2.80	2.70	2.60	2.50
7	6.00	68.30	6.80	4.10	3.80	3.50	3.30	3.90	2.80	2.60
8	7.00	126.30	17.70	8.80	7.20	5.30	3.90	3.30	2.90	2.60
9	8.00	174.70	30.60	16.20	13.30	9.60	6.20	4.40	3.00	2.70
10	9.00	217.00	49.50	31.70	27.20	21.40	15.40	10.70	6.20	3.60
11	10.00	353.20	65.50	46.00	65.50	65.50	40.70	26.70	12.00	6.40
12	11.00	596.90	151.50	124.90	113.20	97.40	85.90	65.40	40.40	22.10
13	12.00	1,537.50	666.60	581.40	535.90	487.40	421.90	343.70	261.00	173.70
14	13.00	1,435.90	505.10	430.10	405.40	388.00	369.00	323.20	245.50	181.60
15	14.00	1,027.80	248.90	208.20	200.00	194.60	217.70	221.50	186.20	154.00
16	15.00	696.50	145.20	115.50	109.80	99.40	118.70	134.60	132.80	116.10
17	16.00	499.90	112.00	84.40	78.90	67.80	74.10	84.90	97.00	85.40
18	17.00	395.60	02.40	75.60	70.00	60.10	57.80	61.00	73.90	63.70
19	18.00	274.20	63.20	48.10	45.30	40.70	40.40	43.00	54.40	47.30
20	19.00	155.60	40.70	33.10	31.40	28.80	30.00	31.90	40.90	36.20
21	20.00	135.70	34.70	29.10	27.60	25.30	25.80	26.20	32.40	28.90
22	21.00	115.60	32.90	28.00	26.60	24.50	24.30	23.70	27.30	24.40

23	22.00	104.10	32.40	27.70	26.30	24.40	23.80	22.70	24.20	21.50
24	23.00	99.10	32.30	27.60	26.20	24.40	23.60	22.30	22.50	19.50
25	24.00	96.00	32.30	27.60	26.20	24.40	23.60	22.20	21.40	18.40
26	25.00	52.40	27.50	25.10	22.50	21.70	20.80	19.00	18.70	16.30
27	26.00	64.30	22.60	21.70	18.30	18.00	17.90	14.40	15.10	13.30
28	27.00	45.30	20.50	20.10	13.50	13.50	14.00	10.00	11.40	10.10
29	28.00	26.10	10.10	9.60	6.40	5.50	7.70	**6.00**	7.80	7.20
30	29.00	13.50	10.10	3.80	2.90	3.00	3.90	3.60	5.40	5.10
31	30.00	7.50	3.90	2.30	2.10	2.10	2.50	2.50	3.90	3.80
32	31.00	4.50	2.30	2.00	2.00	2.00	2.10	2.10	3.00	2.90
33	32.00	3.10	2.00	2.00	2.00	2.00	2.00	2.00	2.40	2.40
34	33.00	2.50	1.90	1.90	1.90	1.90	1.90	1.90	2.10	2.20
35	34.00	2.10	1.90	1.90	1.90	1.90	1.90	1.90	2.00	2.00
36	35.00	2.00	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90
37	36.00	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90

Table 4. Curved Capacity of the Sepaku Semoi Dam Reservoir

No	Elevation	Height from Base	Embung Height	Areas		Volume	
	(mdpl)	m	m	m^2	Ha	m^3	Million m^3
1	9	0	7	1,284.27	0.13	-	-
2	10	1	8	2,336.46	0.23	1,785.24	0.00
3	11	2	9	39,989.53	3.00	15,352.67	0.02
4	12	3	10	41,451.81	4.15	50,933.34	0.05
5	13	4	11	111,644.28	11.17	124,666.39	0.12
6	14	5	12	255,188.17	25.51	303,190.53	0.30
7	15	6	13	359,257.27	35.93	606,697.06	0.61
8	16	7	14	540,972.97	54.10	1,055,923.71	1.06
9	17	8	15	1,036,284.61	103.63	1,831,254.10	1.83
10	18	9	16	1,243,436.61	124.14	2,968,571.65	2.97
11	19	10	17	2,469,834.42	146.98	4,322,600.85	4.32
12	20	11	18	1,772,834.98	177.28	5,941,570.997	5.94
13	21	12	19	2,075,155.78	177.28	5,941,570.97	5,94
14	22	13	20	2,325,185.78	207.52	7,663,598.57	7.86
15	23	14	21	2,668,796.66	266.88	12,557,552.13	12.56
16	24	15	22	2,923,279.75	292.33	15,352,624.75	15.35
17	25	16	23	3,149,391.55	314.94	18,388,258.07	18.39
18	26	17	24	3,353,963.31	335.40	21,639,398.60	21.64
19	27	18	25	3,918,878.77	391.89	25,272,157.6048	25.27

The following is technical data for the Sepaku Semoi Dam obtained from the Kalimantan IV River Regional Office.

3.1. Dam Body (Main Dam)

Type = Homogeneous Soil Fill
El. Dam Base = +9.0 El.m
El. Dam Peak = +27.0 El.m

Dam length = 450 m
Dam height = 18 m
Width of Dam Peak = 7 m
Upstream Slope Slope = 1:3
Downstream Slope Slope = 1:3

3.2. Spillway Building

Spillway Type = Side Spillway
Threshold Type = Free Overflow (Ogee)
El. Peak = +22.0 El.m
Spillway Width = 40 m

4. RESULT AND DISCUSSION

4.1. Flood Search

Flood tracing is carried out to calculate the maximum water level of the reservoir [29]. This is done to determine the most cost-effective (optimal) height of the dam but remains safe from the risk of flooding. The basic formula chosen is:

$$I - O = \frac{ds}{dt} \tag{3}$$

with :
I = Reservoir inflow (m^3/sec)
O = Reservoir outflow (m^3/sec)
$\frac{ds}{dt}$ = Water discharge held in a reservoir for a short period of time

$$Jika, dt = \Delta t \rightarrow I = \frac{1_1 + 1_2}{2} \tag{4}$$

$$Q = \frac{Q_1 + Q_2}{2} \tag{5}$$

$$ds = S_2 - S_1 \tag{6}$$

So, the equation can be written as:

$$\frac{1_1 + 1_2}{2} S_2 - S_1 \tag{7}$$

This equation can be changed to the following:

$$\frac{1_1 + 1_2}{2} + [\frac{S_1}{\Delta t} - \frac{Q_2}{2}] = [\frac{S_2}{\Delta t} - \frac{Q_2}{2}] \tag{8}$$

With :
S_1 = Reservoir storage at the start of the tracking period (measured from the top of the spillway structure/tunnel axis)
Q_2 = The debit that occurs at the start of the tracking period

4.2. Flow on the Spillway

A spillway is a building used to overflow water that cannot be accommodated by a dam. To determine the dimensions of the spillway, it is adjusted to the 1000 year return period discharge (Q1000) and must be able to pass the maximum flood discharge (QPMF) without experiencing overtopping [30]. Calculation of discharge through the spillway uses the following formula:

$$Q = C : L : H^{\frac{3}{2}} \tag{9}$$

$$Cd = 2,2 - 0,0416(H\_d/P)^{0,99} \tag{10}$$

$$C = 1,6(1 + 2a(h/H\_d))/(1 + a(h/H\_d)) \tag{11}$$

Where :
Q = Discharge (m^3/sec)
C = Spillover coefficient
Cd = Overflow coefficient when h = H_ d
L = Effective width of spillway (m)
H = Difference in water surface elevation of the reservoir and Mercu (m)
P = Height of the spillway from the apron (m)
A = Constant

The magnitude of the overflow discharge coefficient (C) of a standard type of dam can also be obtained using the Iwasaki formula as follows:

$$Cd = 2,20\text{–}0,0,416(Hd/W)^{0,99} \tag{12}$$

$$C = 1,60(1 + 2ah/Hd)/(1 + ah/Hd) \tag{13}$$

Information :
C = Overflow discharge coefficient
Cd = Overflow discharge coefficient when h = Hd
H = Water height above the spillway beacon (m)
Hd = Design pressure height above the weir beacon (m)
W = Weir height (m)
α = Coefficient value when h = Hd so that C = Cd

4.3. Reservoir Capacity Curve

The flood discharge data used is 1000 year return period flood discharge data (Q1000) and PMF flood discharge (QPMF) [31]. To determine the maximum flood discharge, you need to take the largest discharge value from each return period [32]. Thus, the maximum design discharge of the Q1000 is 666,600 m^3/s. Meanwhile, the QPMF is 1,537.50 m^3/s. The curved graph of reservoir capacity can be seen in Fig 4.

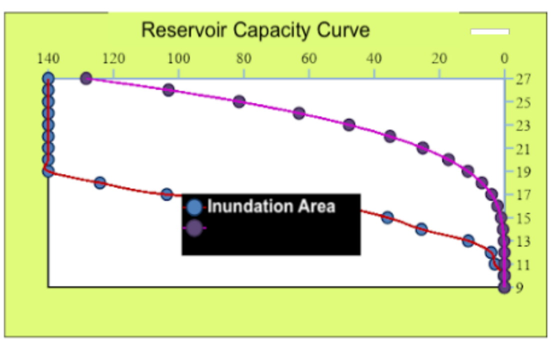

Figure 4. Curved Graph of the Reservoir Capacity of the Sepaku Semoi Dam

4.4. Flood Tracing Through Spillways

This is done to find out whether the dam is experiencing overtopping or not. The flood discharge used is the Q1000 and QPMF flood discharge [33]. The basis for calculating flood tracking uses data as below. Data:

Spillway Width (B) = 40 m
C initially = 2,117
Overflow Threshold Height (W) = 2 m
Spillway Peak Elevation = 22.00 m
Dam Peak Elevation = 27.00 m
Q1000th = 666.6 m^3/sec
QPMF = 1537.5 m^3/sec

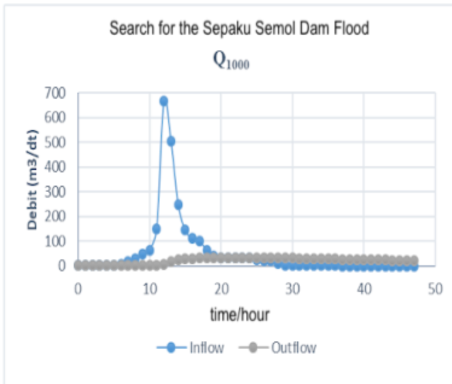

Figure 5. Inflow Outflow Relationship Graph on the Spillway

It is known that the largest abundant discharge is 666,600 m^3/sec at an elevation of +22,636 m, while the dam peak elevation is +27.00 m so there is a difference where the water surface elevation is lower than the dam peak elevation of 4,364 m [34].

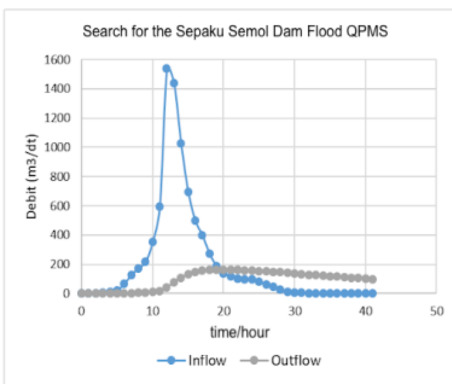

Figure 6. QPMF Inflow Outflow Relationship Graph on the Spillway

It is known that the largest abundant discharge is 1537.5 m^3/sec at an elevation of +23,785 m, while the elevation of the dam top is +27.00 m so it has a remaining buffer of 3,215 m. The remaining guard height is in accordance with the guard height standard, namely >0.75 m for PMF flood conditions with spillways without gates. This proves that the Sepaku Semoi Dam does not experience overtopping [35].

4.5. Parameter Calculation

Based on flood investigations that have been carried out, the Sepaku Semoi Dam does not experience overtopping so the parameter calculations carried out are only for the piping scenario [36]. The piping scenario parameters used include top, middle and bottom piping. This parameter is used in the Zhong Xing HY21 program input [37].

Table 5. Fracture Parameters

Scenario	Flood Water Level			Item
	Upper Piping	*Middle Piping*	*Basic Piping*	
	Scenario 1	Scenario 2	Scenario 3	
Upper Boundary	As Dam	As Dam	As Dam	-
Lower Boundary	Downstream	Downstream	Downstream	-
Elv. Crest Dam	27	27	27	m
Dam Length	450	450	450	m
Elv. MAB	22.19	22.19	22.19	m
Spillway Width	40	40	40	m
Elv. Crest Spillway	22	22	22	m
H_Fail	25.19	25.19	25.19	m
H_BM	9	9	9	m
B_BAR	57.46	75.63	85.93	m
Time_BF	11.96	3.99	2.39	hour
	43059.91	14353.30	8611.98	s
H_PIPE	22.492	17.095	11.698	m
Q_{inflow} *PMF*	1537.5	1537.5	1537.5	m^2/s

The following is an explanation of the input for the Padan dam collapse simulation for the Sepaku Semoi Dam:

1. Elevation of the dam crest (m) is the elevation of the dam crest.
2. Reservoir width at the dam (m) is the width of the dam.
3. Initial reservoir water surface elevation (m) is the elevation where the initial reservoir water level was when it collapsed.
4. Discharge coef. for flow over the dam crest (m0.5/s) is coefficient whose value range is 1.38 - 2.21.
5. Uncontrolled spillway width (m) is the width of the spillway.
6. Uncontrolled spillway crest elevation (m) is the elevation of the spillway crest.
7. Uncontrolled spillway discharge coef. (m0.5/s) is a coefficient whose value is 1.38 - 2.21.
8. H_ FAIL is the elevation of the reservoir water level when the dam is destroyed.
9. H_ BM is the elevation of the reservoir base when the dam will start to collapse.
10. B-BAR is the average fracture width according to Freolich.
11. TIME_ BF is the time of collapse according to Freolich.
12. H_ PIPE is the piping elevation of the initial center of failure which is only found in the piping simulation scenario.

5. CONCLUSION

Based on the analysis of the simulation of the collapse of the Sepaku Semoi Dam, the following conclusions were drawn: The Sepaku Semoi Dam did not collapse due to overtopping. At the Q_{1000}-year flood discharge, which was the largest overflow, reaching 666.600 m^3/sec at an elevation of +22.636 m with a freeboard of 4.364 m, and at the peak maximum flood (QPMF) with a discharge of 1537.5 m^3/sec at an elevation of +23.785 m with a freeboard of 3.215 m, neither resulted in overtopping because the peak elevation of the Sepaku Semoi Dam is +27 m, ensuring that the freeboard exceeded the standard requirement of 0.75 m.

Furthermore, through the calculation of crack parameters, it was found that the average collapse widths for upper piping were 57.46 m, middle piping were 75.63 m, and bottom piping were 85.93 m. The collapse durations for upper piping were calculated to be 11.96 hours, middle piping 3.99 hours, and bottom piping 2.39 hours. These data provide further insight into the potential collapse process of the dam under certain conditions.

Thus, this analysis provides a deeper understanding of the contributing factors to dam collapse and reinforces the understanding of the structural integrity of the Sepaku Semoi Dam in facing extreme flood loads. Although it did not collapse due to overtopping during the simulation, detailed understanding of collapse parameters is important for future planning and risk mitigation.

6. DECLARATIONS

6.1. Author Contributions

Conceptualization: W.J.; Methodology: A.N.B.S.P.; Software: E.V.A.; Validation: W.J. and A.N.B.S.P.; Formal Analysis: S.A. and D.P.A.H.; Investigation: W.J.; Resources: A.N.B.S.P.; Data Curation: A.N.B.S.P.; Writing Original Draft Preparation: E.K. and N.Z.O.; Writing Review and Editing: E.K. and N.Z.O.; Visualization: A.N.B.S.P.; All authors, W.J., A.N.B.S.P., E.V.A., S.A., D.P.A.H., E.K. and N.Z.O., have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

[1] D. S. S. Wuisan, R. A. Sunardjo, Q. Aini, N. A. Yusuf, and U. Rahardja, "Integrating artificial intelligence in human resource management: A smartpls approach for entrepreneurial success," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 334–345, 2023.

[2] B. Rawat, A. S. Bist, B. S. Riza, A. Oktariyani, and U. Rahardja, "Analysis of examination process during covid and post covid in indian context," in *2021 9th International Conference on Cyber and IT Service Management (CITSM)*. IEEE, 2021, pp. 1–5.

[3] S. G. Aniskurlillah, R. Asmaranto, and P. T. Juwono, "Analisa keruntuhan bendungan muka kuning batam menggunakan aplikasi zhong xing hy21," *vol*, vol. 28, pp. 1286–1290, 2018.

[4] L. M. Limantara and T. Juowono, "Flood behavior analysis due to dam break (case study in cengklik dam, center java of indonesia)," *International Journal of Emerging Technology and Advanced Engineering*, vol. 2, no. 11, pp. 3–4, 2012.

[5] P. A. Sunarya, U. Rahardja, S. C. Chen, Y.-M. Lic, and M. Hardini, “Deciphering digital social dynamics: A comparative study of logistic regression and random forest in predicting e-commerce customer behavior,” *Journal of Applied Data Sciences*, vol. 5, no. 1, pp. 100–113, 2024.

[6] H. Chen and J. Ren, “The effect of influencer persona on consumer decision-making towards short-form video ads—from the angle of narrative persuasion,” in *International Conference on Human-Computer Interaction*. Springer, 2022, pp. 223–234.

[7] F. Serafini and S. F. Reid, “Multimodal content analysis: expanding analytical approaches to content analysis,” *Visual Communication*, vol. 22, no. 4, pp. 623–649, 2023.

[8] Z. Cheng and Y. Li, “Like, comment, and share on tiktok: Exploring the effect of sentiment and second-person view on the user engagement with tiktok news videos,” *Social Science Computer Review*, vol. 42, no. 1, pp. 201–223, 2024.

[9] A. Pambudi, N. Lutfiani, M. Hardini, A. R. A. Zahra, and U. Rahardja, “The digital revolution of startup matchmaking: Ai and computer science synergies,” in *2023 Eighth International Conference on Informatics and Computing (ICIC)*. IEEE, 2023, pp. 1–6.

[10] J. Feldkamp, “The rise of tiktok: The evolution of a social media platform during covid-19,” *Digital responses to Covid-19: Digital innovation, transformation, and entrepreneurship during pandemic outbreaks*, pp. 73–85, 2021.

[11] K. Mirdad, O. P. M. Daeli, N. Septiani, A. Ekawati, and U. Rusilowati, “Optimizing student engagement and performance usingai-enabled educational tools,” *CORISINTA*, vol. 1, no. 1, pp. 53–60, 2024.

[12] M. Yusup, E. Sukmawati, R. Ramadhan, and M. I. Suhaepi, “Blockchain technology for cashless investments and transactions in digital era with swot approach,” *Blockchain Frontier Technology*, vol. 2, no. 1, pp. 17–23, 2022.

[13] A. R. Thurik, D. B. Audretsch, J. H. Block, A. Burke, M. A. Carree, M. Dejardin, C. A. Rietveld, M. Sanders, U. Stephan, and J. Wiklund, “The impact of entrepreneurship research on other academic fields,” *Small Business Economics*, pp. 1–25, 2023.

[14] Q. Aini, I. Handayani, and F. H. N. Lestari, “Utilization of scientific publication media to improve the quality of scientific work,” *APTISI Transactions on Management*, vol. 4, no. 1, pp. 1–12, 2020.

[15] K. Symons, I. Vanwesenbeeck, M. Walrave, J. Van Ouytsel, and K. Ponnet, “Parents’ concerns over internet use, their engagement in interaction restrictions, and adolescents’ behavior on social networking sites,” *Youth & Society*, vol. 52, no. 8, pp. 1569–1581, 2020.

[16] C. Lukita, M. Hardini, S. Pranata, D. Julianingsih, and N. P. L. Santoso, “Transformation of entrepreneurship and digital technology students in the era of revolution 4.0,” *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 291–304, 2023.

[17] A. N. Mufiidah and R. D. Destiani, “The benefits, challenges, and future of blockchain and the internet of things,” *Blockchain Frontier Technology*, vol. 3, no. 1, pp. 13–25, 2023.

[18] B. Aulet, *Disciplined Entrepreneurship Expanded & Updated: 24 Steps to a Successful Startup*. John Wiley & Sons, 2024.

[19] G. Ravi, M. F. Nur, and A. Kiswara, “Analyzing changes in traditional industries: Challenges and opportunities in the e-commerce era,” *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 5, no. 1, pp. 39–49, 2023.

[20] Y. Pan, S. Zhang, and M. Zhang, “The impact of entrepreneurship of farmers on agriculture and rural economic growth: Innovation-driven perspective,” *Innovation and Green Development*, vol. 3, no. 1, p. 100093, 2024.

[21] P. Luo, M. Luo, F. Li, X. Qi, A. Huo, Z. Wang, B. He, K. Takara, D. Nover, and Y. Wang, "Urban flood numerical simulation: Research, methods and future perspectives," *Environmental Modelling & Software*, vol. 156, p. 105478, 2022.

[22] V. V. Febiandini and M. S. Sony, "Analysis of public administration challenges in the development of artificial intelligence industry 4.0," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 2, pp. 164–168, 2023.

[23] S. Vedula, C. Doblinger, D. Pacheco, J. G. York, S. Bacq, M. V. Russo, and T. J. Dean, "Entrepreneurship for the public good: A review, critique, and path forward for social and environmental entrepreneurship research," *Academy of Management Annals*, vol. 16, no. 1, pp. 391–425, 2022.

[24] B. Rawat and D. Maulidditya, "Entrepreneurship in information technology as a method for improving student creativity in the digital economy," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 4, no. 1, pp. 32–37, 2022.

[25] R. G. Holcombe, "Engineering is not entrepreneurship," *Moonshots and the New Industrial Policy: Questioning the Mission Economy*, pp. 43–60, 2024.

[26] R. Tarmizi, N. Septiani, P. A. Sunarya, and Y. P. A. Sanjaya, "Harnessing digital platforms for entrepreneurial success: A study of technopreneurship trends and practices," *Aptisi Transactions on Technopreneurship (ATT)*, vol. 5, no. 3, pp. 278–290, 2023.

[27] N. Sikki, Z. Aripin, and N. G. Fitrianti, "Business innovation and critical success factors in digital transformation and challenging times: An econometric analysis of startup viability and success," *KRIEZ ACADEMY: Journal of development and community service*, vol. 1, no. 2, pp. 1–15, 2024.

[28] S. Alateeg, A. Alhammadi, S. I. Al-Ayed, and M. A. Helmi, "Factors influencing on behavioral intention to adopt artificial intelligence for startup sustainability," *Kurdish Studies*, vol. 12, no. 1, pp. 2924–2941, 2024.

[29] L. Bzhalava, J. Kaivo-oja, and S. S. Hassan, "Digital business foresight: Keyword-based analysis and corex topic modeling," *Futures*, vol. 155, p. 103303, 2024.

[30] M. Gruber and S. Tal, "Reflecting on the creation of the market opportunity navigator (4th tool in the lean startup)," *Journal of Business Venturing Design*, vol. 3, p. 100017, 2024.

[31] W. Rusdi, W. Firmansyah, and H. Tahir, "Mosque-based economic development over a decade with bibliometric review analysis," *Jurnal Ilmu Ekonomi dan Bisnis Islam*, vol. 5, no. 2, pp. 172–186, 2023.

[32] A. S. Bist, "The importance of building a digital business startup in college," *Startupreneur Business Digital (SABDA Journal)*, vol. 2, no. 1, pp. 31–42, 2023.

[33] H. Yanfika and N. Nurdiana, "Model of accreditation caceleration for international reputable journals," *Open Global Scientific Journal*, vol. 2, no. 2, pp. 66–80, 2023.

[34] M. D. Schultz and P. Seele, "Towards ai ethics' institutionalization: knowledge bridges from business ethics to advance organizational ai ethics," *AI and Ethics*, vol. 3, no. 1, pp. 99–111, 2023.

[35] C. M. R. de Magalhães, "Corporate social responsibility, business ethics, sustainability, and innovation: a theoretical analysis of the importance of these concepts in times of pandemic," in *Innovation and Sustainable Manufacturing*. Elsevier, 2023, pp. 151–178.

[36] E. Dollan, B. D. K. Ramadhan *et al.*, "Assessing the outcomes of circular economy and waste management partnerships between indonesia and denmark," *IAIC Transactions on Sustainable Digital Innovation (ITSDI)*, vol. 5, no. 1, pp. 76–83, 2023.

[37] I. Sitaridis and F. Kitsios, "Digital entrepreneurship and entrepreneurship education: a review of the literature," *International Journal of Entrepreneurial Behavior & Research*, vol. 30, no. 2/3, pp. 277–304, 2024.

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