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The Effect of Operational Risks for Digital Banking Services at Banks

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Abstract

Research aims: This research aims to analyze active digital banking users' perceptions of bank operational risks in providing digital banking services.

Design/Methodology/Approach: This research design used a quantitative approach. The population in this study was banking customers who used Internet banking services. The sample taken in this study was 240 respondents from banks in the Banyumas Regency, Central Java, Indonesia. The method performed was purposive sampling. It used five banking risk management indicators.

Research findings: Most people in the Banyumas region did not agree that Internet banking had high operational risks. As such, banks need to look at other operational risks, such as service disruptions, outsourcing failures, and internal fraud.

Theoretical contribution/Originality: The Technology Acceptance Model (TAM) is an information system theory that models of how users want to accept and use technology. This model proposes that when users are offered a new system, several factors influence their decision about how and when to use the system, especially regarding the usefulness, ease of use, and external factors on beliefs, attitudes, and purpose of use.

Practitioners/Policy implications: This research implemented digital banking and customer perceptions of bank operational risks in providing digital banking services because they are essential for understanding the digital banking industry.

Research limitations/Implications: This study only used five indicators of banking operational risks, consisting of process, human, system, external, and legal. Other aspects, such as financial, marketing, and others, have yet to be included in this banking risk research indicator. For further research, it is suggested to add research variables, not only focusing on Internet banking applications but also on other digital banking products, such as mobile banking, phone banking, and SMS banking.

Keywords: Operational Risk; Digital Banking; Customer Perception

Introduction

The rapid development of information technology has brought the life of the world community into a new era, often called the era of the Industrial Revolution 4.0. The worldwide money related industry has been changed essentially over the a long time with the assistance of troublesome advancements of advanced (Uddin et al., 2023). This era is marked by the development of various technological innovations, such as the Internet of Things (IoT), Cloud Computing, Artificial Intelligence (AI), and Machine Learning. The development and innovation of information technology have also changed many aspects of human life, from lifestyle and the world of work to people's economic activities.

Technological development is changing society, economics, banks, and banking (Balkan, 2021). In addition, technological developments have encouraged the emergence of several new business models on a digital basis that are far more efficient and innovative, bringing both opportunities and challenges that need to be managed properly. Industrial Revolution 4.0 is also about digital transformation. With the digitalization movement, the community's economic and financial activities seem to have no boundaries in space and time. Economic transactions can be done anywhere, anytime, and from anywhere. This has required companies to make changes to meet digital transformation needs in people's economic and financial activities to survive. Industry 4.0 evolution has also penetrated the banking sector. Monetary direction, particularly the controls on advertise get to of banks and the limitations on deposit/lending rates, is one of the most causes of the quick development of the monetary segment and the financialization of vitality ventures (Si et al., 2021).

Recently, service quality has appeared more prominent consideration in commercial explore because of its job as a standout amongst the most essential factor that can build banks focused position (Hadid et al., 2020). This evolution requires banks to adapt and make changes. Demands for significant changes in the banking industry as a result of developments in information technology, in general, can be identified in four aspects, changes in consumer expectations, improvement in the quality of banking products and services by utilizing data (data-enhanced products), the emergence of new partnerships with big-tech and start-up companies, and changing the operational model to a digital business model. Hence, banking needs to transform into a digital bank. Digital bank prioritizes platform-based and fully digital business processes with a lean and agile organizational structure and has advanced digital capabilities. A lean and agile organizational structure focuses more on collaboration and integration with other parties, such as having a large consumer-oriented marketplace community. Advanced digital capabilities also focus on using up-to-date and agile technologies with high scalability and data-driven business models with simple and automated processes by promoting an open platform. The bank, for financial or lawful reasons relating to the borrowers money related trouble, allowed the borrower concessions that the bank would not something else consider. These concessions included loose intrigued standards, expanded time period for reimbursement or softening the advance conditions. These concessions amplified to the wronged borrower were to ease the borrowers' money related circumstance for a restricted period. Whether the borrower would be able to recoup in his commerce and begin advance reimbursement within the future remained a unsafe component (Bawa & Basu, 2020).

Additionally, digital banking is a trend in the banking landscape for the future. In recent years, digital banking began to receive a lot of attention from policy makers, bankers, technology companies and consumers (Ni, 2020). A significant number of banking transactions are now carried out on most people's computer or mobile phone (Kitsios et al., 2021). Digital banking services in the millennium modern days banking activity has become the trending topic of the financial industry (Wadesango & Magaya, 2020). Digital banking is an operating model based on a technology platform to exchange information and conduct transactions between banks and customers. This process is done through digital devices which are connected to computer software in the internet environment.

Customers do not have to come to physical branches of banks to make transactions (Nguyen, 2020). In this regard, the COVID-19 pandemic has prompted consumers to reduce cash transactions. Before the pandemic, the trend of transactions towards cashless transactions had increased, but the COVID-19 pandemic has accelerated this process on the grounds of reducing the potential for transmission of the virus. Meanwhile, from the producer side, shops, restaurants, and hotels are starting to use cashless transactions as a branding tool to restore consumer confidence and provide security guarantees. Also, smartphones and various applications are increasingly functioning to carry out various financial transactions. The digital transformation of the financial sector has led to more digitized business models and processes, but has also created new products and services (Jünger & Mietzner, 2021). Various transactions can now be done via smartphone, from shopping, saving, borrowing money, paying bills, and paying installments.

The existence of the COVID-19 pandemic has also caused digitalization to develop rapidly. This makes it easier for people to understand financial literacy, especially in the current era. Nonetheless, this is also accompanied by new financial system security risks in the digital era. Currently, IDIC is transforming towards a risk minimizer through the implementation of the IDIC Strategic Plan 2022–2026, in which, in its development, IDIC continues to innovate to improve services to stakeholders through the implementation of Single Customer View (SCV) and integration of banking reporting. In implementing digital banking, the customer's perception of bank operational risks in providing digital banking services is absolutely understandable for the digital banking industry. This causes the importance of research to analyze active digital banking users' perceptions of bank operational risks in providing digital banking services. At the same time, it is believed that digital banking is broader than the activity of an online platform or mobile banking, as it relates to the automation of every stage of a bank's relationship with a customer (Melnychenko et al., 2020).

Risk management is a fairly important factor in managing a bank. Operational risk is faced by all types of banks (Nguyen, 2022). Financial institutions, of course, have to think about ways to mitigate the risks that will be experienced in the future. The most important thing in implementing risk management is to carry out appropriate procedures and risk management so that the bank's business activities can run effectively. Regarding the possibility of losses experienced by banks in the future, they can make appropriate decisions based on information, and this information can be used as a benchmark for bank performance. The application of risk management is very useful for banks because it can provide an overview of a manager's bank. Beneath operational chance, the credit organizations too can and ought to shape certain saves, for a covering of this sort of chance, be that as it may stores may be not sufficient, at that point the chance can moreover be secured by net benefit. Hence, possibility of covering of operational dangers due to net benefit should ended up an critical perspective for development of systematic base within the field of an evaluation and the financial examination of operational dangers (Daryakin & Andriashina, 2015). Case against a bank is demonstrative of operational risk since it regularly proposes disappointment to preserve a solid framework of internal control (McNulty & Akhigbe, 2017).

Based on the above explanation, analyzing active digital banking users' perceptions of bank operational risks in providing digital banking services is crucial. For that reason, the population in this study was banking customers who used Internet banking services. The samples taken in this study were 250 banking customer respondents in the Banyumas Regency, Central Java. The method used was purposive sampling. It employed five banking risk management indicators: internal process risk with six indicators, HR risk with six indicators, system risk with four indicators, legal risk with four indicators, and external risk with six indicators. The characteristics of the respondents were then tested with the crosstab method.

Literature Review and Hypotheses Development

Digital Banking

The transition to technologically based banking where banking services are administered to customers through an array of open and customized channels such as automated teller machine (ATM) and mobile, online/Internet platforms (Egala et al., 2021). The digital banking systems meet many needs of smart city (Popova, 2021). Digital banking services or digital banking use electronic/digital facilities owned by banks and/or digital devices operated independently by prospective customers. Banking services/activities provided by designated banking entities through the customer may provide financial advice, investment, electronic commerce (e-commerce), and other benefits to bank customers. As such, focusing on e-loyalty from the perspective of millennials is vital for both theoretical and online marketing practices (Purani et al., 2019). It helps banking customers enjoy the comfort of accessing and performing all traditional banking activities at their convenience (Ahmed & Sur, 2021).

Fintech has been growing rapidly and attracting customers in recent years. Even decades ago, scholars were aware of the impact that the development of information technology might have on financial markets (Hao et al., 2023). According to research by Nasri and Charfeddine (2012), perceived ease of use can positively influence attitudes towards technology use. Although digital banks have been used with virtual, digital, or Internet banking, the fundamental difference is the existence of physical branches where digital banks rely solely on the digital infrastructure to cover all types of transactions better than traditional ones. Besides convenience, digital banks offer more financial and psychological benefits than traditional banks (Windasari et al., 2022).

Further, attitudes concerning Internet banking refer to the positive or negative impact of using Internet banking services for payment or other transactions. Previous research analyzed how the competitiveness among banks was affected by digital finance. Findings indicated that the catfish effect of digital finance was true and has a strong favorable impact on bank competitiveness. While the impact of the digitization level index is notably negative, the coverage breadth of digital finance has a largely favorable impact on bank competition (Gao & Wang, 2023). Internet banking uses Internet media for banks to facilitate and carry out online transactions using traditional and new products. According

to Nugraha and Atahau (2018), the Technology Acceptance Model (TAM) has been widely used in information systems research to know user reactions to information systems. According to Davis (1989), the Technology Acceptance Model (TAM) is an information system theory that creates a model of how users want to accept and use technology. This model proposes that when users are offered a new system, several factors influence their decision about how and when to use the system, especially regarding the usefulness, ease of use, and external factors on beliefs, attitudes, and purpose of use. Digital banking is a refers to accomplishment of financial transactions over the Internet through a bank's secured websites (Pavithra, 2021).

On the other hand, the customer experience is improved by the introduction of digital banking. Customer/employee experience, revenue growth, and cost reduction are the three key drivers behind banks going totally digital in Indonesia (Windasari et al., 2022). Services to banking customers related to Internet banking have three stages: (1) informational services in the form of websites related to information on financial services; (2) communication, where customers and banks can communicate with the facilities on the website; and (3) transactions (transactional/advance), i.e., customers can carry out financial transactions (transfer funds, check balances, and others for the type of payment). Various types of Internet banking, which include fund transfers, balance information, account mutations, exchange rate information, bill payments (e.g., credit cards, telephone, and electricity), and purchases (e.g., phone credit, train/air tickets, and hotels), can be accessed by customers in banking transactions (financial and non-financial) using a computer connected to the bank's internet network.

Operational Risk

Several bank business activities have increased. Due to this increase, banks in Indonesia are now facing diverse types of complex risks, and therefore, banks play an important role in increasing the need to implement risk management and mitigate risks associated with banking operations (Cahyaningrum & Atahau, 2020). Risk is the potential loss that may occur due to a certain event. Bank risk is a potential event, both predictable and unpredictable, which can harm the bank itself (Fasa et al., 2016). Operational risk shows itself emphatically in keeping money and, maybe, more intriguingly than in most businesses (Onyiriuba, 2016).

Previous research has investigated the relationships between operational losses, business characteristics, and the financial and economic environment to better comprehend the relationship between operational and systemic risks and pinpoint the underlying mechanisms. According to this research, when systemically significant institutions and institutions more vulnerable to distress are affected, operational losses have a greater impact on systemic risk. Additionally, although the major effects are still evident in normal times, the researchers demonstrate that operational losses have more obvious effects on systemic risk contributions during financial crises and challenging economic conditions. Also, the researchers discovered that operational losses affect BHCs directly (for example, through the market value of equity effects) and indirectly (through a channel of correlated operational losses) (Berger et al., 2022). Other previous study also suggest for policy-makers and controllers within the MENA locale with regard to the advancement and

usage of SSB and administration components that can progress operational chance divulgences (Elamer et al., 2020).

Table 1 Operational Risk Types

No	Risk Types
1	The process of controlling existing activities has not yet been implemented properly.
2	Too complex passwords
3	Less effective process
4	Errors when inputting data are caused by a lack of information regarding the correct procedure.
5	Political situations lead to riots or demonstrations.
6	There are natural disasters on a national scale.
7	Theft of bank information by customers/internal parties/external parties
8	Customers cannot access transactions through online banking due to network absence or problems with system providers (down).
9	Bank systems are vulnerable to viruses or malware.
10	Sending SMS or Email as proof of transaction cannot be sent.
11	Unable to save customer data and recommend it
12	Theft of customer user ID by external parties
13	Fraudsters acting on behalf of clients and unauthorized access to customer accounts
14	External parties commit fraud by acting on behalf of the bank and asking for a customer's user ID or password.
15	The perpetrator cooperated with bank employees to connect the ATM with personal account numbers or other accounts.
16	Fraudsters use other domains to access the bank's system.
17	The customer made an initial deposit to open an account, but the bank rejected the opening.
18	Bank systems are hacked by external parties.
19	Employees open fake accounts with customers to get incentives.
20	Customers cannot provide identity cards and other document obligations.
21	Customers do not accept ATM cards.
22	The bank does not have a customer data backup.
23	Customers cannot make transactions through ATMs.
24	Customers reject transactions that have been made.

In Indonesian Banking Regulation No. 5 concerning the Implementation of Risk Management 11/22/PBI/2010 concerning Amendments to /8/PBI/2003, risk management is defined as a set of methods and procedures, while the risk results from losses caused by events. Its benefits include monitoring, measuring, monitoring, and controlling banking risk. The following are the types of risks that need to be managed by banks properly. Operational risk arises from internal process inefficiencies, human errors, system failures, and external party problems that affect the bank's operational performance. Thus, operational risk control must provide operational certainty, soundness, and reliable reporting.

Research Method

This research design used a quantitative approach. The population in this study was banking customers. The data sources in this research were primary ones. They were obtained directly by distributing questionnaires to bank customers. According to Darmadi (2013), the research method is a scientific way to obtain data with a scientific purpose. The scientific method means that research activities are based on scientific characteristics, i.e., rational, empirical, and systematic. In addition, the method used in this research was descriptive, used to determine customer operational and digital banking risks.

The following table presents the definition and variables measurement in this study.

Table 2 Variables Definition and Indicators

Variables	Variable Definition	Indicators
Internal Process Risk	Internal process risk is defined as the risk associated with the failure of bank processes and procedures (Von Tamakloe et al., 2023).	Error in making transactions Incomplete documentation/archives Negligence of marketing officers Weak internal controls Errors in providing information Incomplete or incorrect financial reports
Human Risk	The risk of human error is defined as the risk associated with bank employees. Operational risk events can be carried out intentionally or not and are not limited to certain units (Von Tamakloe et al., 2023).	Occupational health and safety issues High employee turnover Internal fraud Disputes between employees Bad management practices Inadequate employee training Too dependent on certain employees
System Risk	System risk is associated with using systems and technology (Von Tamakloe et al., 2023).	Incomplete data (data corruption) Data entry errors Inadequate control of data changes Interruption of service, either partial or complete interruption
External Risk	External risk is defined as the risk that occurs outside the organization's control, but external risk rarely occurs within the organization. However, external risks have a considerable impact if they occur in an organization (Von Tamakloe et al., 2023).	Theft and external fraud Fire Another disaster Failure of outsourcing agreements Implementation of new provisions Employee riots and demonstrations Utility service failure (such as power outage)
Legal Risk	Banks must ensure that the bank's website provides information that allows prospective customers to obtain accurate information regarding the identity and legal status of the bank before making transactions through Internet banking (Von Tamakloe et al., 2023).	Implementation of know-your-customer provisions Bank confidentiality Implementation of provisions regarding customer protection Application of data protection provisions

The calculation of proportional stratified random sampling could be done by calculating the total sample size based on the Taro Yamane and Slovin formulas as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Description:

n = Sample size/number of respondents

N = Population size

E = The percentage of allowance for accuracy of sampling errors that can still be tolerated

$e = 0.1$

In the Slovin formula, there are the following provisions:

e value = 0.1 (10%) for a large population

e value = 0.2 (20%) for a small population

The sample range that can be taken from the Slovin technique is between 10 and 20% of the study population. Since the total population in this study was 1,200, the percentage of allowance used was 20%, and the calculations' results could be rounded up to achieve suitability. Then, to find out the research sample, the following calculation was used:

$$n = \frac{1.200}{1 + 1.200 (20)^2} = 240$$

To show the Likert scale range of the average respondent's answers to the four variables in this study, the below formula can be operated:

$$\text{Interval} = \frac{\text{max value} - \text{min value}}{\text{number of class}} = \frac{5-1}{5} = 0,8$$

Range	Description
4.20–5.00	Totally disagree
3.40–4.19	Disagree
2.60–3.39	Neutral
1.80–2.59	Agree
1.00–1.79	Totally agree

Results and Discussion

This research used operational risk as a variable comprising five banking risk management indicators. They were internal process, human, system, external, and risks. After conducting research and processing data, the results are presented as follows, starting with the profile and characteristics of the respondents and then presenting the data resulting from statistical processing.

Respondent Characteristics

Here are the results of the data processed. The respondent information and characteristics are shown below.

Table 3 Respondent Characteristics

Category	Sub-Category	Number of Respondents	Percentage
Gender	Male	108	45%
	Female	132	55%
Status	Married	95	40%
	Single	145	60%
Income	< 2 million	57	24%
	2–5 million	139	58%
	> 5 million	44	18%
Use of E-banking in a Month	Never	0	0%
	1–3 times	30	13%
	4–6 times	48	20%
	7–10 times	64	27%
	> 10 times	98	41%
Age	15–20	15	6%
	20–25	112	47%
	25–30	75	31%
	30–35	38	16%
Last Education	Did not finish elementary School	0	0%
	Elementary School (EM)	0	0%
	JHS/Equal	2	1%
	SHS/VHS/Equal	57	24%
	Academy/Bachelor (D3/S1)	181	75%
Time to Use E-banking	< 1 year	8	3%
	1–2 year	24	10%
	3–4 year	16	7%
	4–5 year	17	7%
	> 5 years	175	73%

Validity and Reliability Testing

According to Ghozali (2016), validity testing helps determine the feasibility of questionnaire items when defining a variable. This questionnaire will support a certain set of variables. Validity tests must be run for each item of validity testing questions. The r-count results are then compared with the r-table at $df = n - 2$, using a significance level of 5%. For valid and positive r-table and r-count or r-count having significance $< \alpha 0.05$ and for $N = 100$, with 0.05, the r-table is 0.195. The test results showed a significance level of 0.00 and < 0.05 for all variables, so all variables in this study could be valid.

Further, the reliability test was carried out jointly on all questions. If $\alpha > 0.60$, it is reliable. It can be seen in Table 4 that Cronbach's alpha value of all variables exceeded 0.60 so that data could be trusted as a variable measuring tool.

Table 4 Reliability Test Results

Variables	Cronbach's Alpha	Reliability standards	Description
Internal Process Risk	0.746	0.6	Reliable
Human Risk	0.692	0.6	Reliable
System Risk	0.686	0.6	Reliable
External Risk	0.654	0.6	Reliable
Legal Risk	0.657	0.6	Reliable

The category of each variable was determined by looking at the average value of each variable. The following is a description table that explains the variables in this study. Descriptive statistical data from Table 5 describes the risk of internal processes in banking, showing that all indicators had an average value between the range of 3.40–4.19, which means that banking customer respondents did not agree that internal process risks in Internet banking are risky to use. In other words, respondents considered Internet banking to be relatively safe. Next, descriptive statistical data in Table 6 indicates that the average overall item of the human risk variable at the bank was between the range of 3.40 and 4.19, denoting that the average banking customer respondent disagreed that human risk in Internet banking is risky.

Table 5 Internal Bank Process Risk Description

Internal Process Risk	Average	Category
Transaction error	4.80	Disagree
Incomplete documentation	3.87	Disagree
Negligence of marketing officers	3.89	Disagree
Weak control	4.09	Disagree
Misinformation	4.08	Disagree
Incomplete financial reports	4.60	Disagree

The second and third indicators revealed that the average respondent was included in the neutral category. Some respondents did not agree that health problems, dependence on employees, and bad management practices were high. This is interesting because there were indications that respondents were less knowledgeable and were unsure about the absence of high employee turnover and internal fraud.

Table 6 Human Risk Description

Human Risk	Average	Category
Occupational health and safety issues	4.51	Disagree
High employee turnover	3.14	Neutral
Internal deception	3.65	Neutral
Disputes between employees	3.27	Disagree
Bad management practice	4.15	Disagree
Inadequate training	3.65	Disagree
Depends on the specific employee	4.10	Disagree

Descriptive statistical data in Table 7 about system risk demonstrate that all indicators had an average value between the range of 3.40–4.19, implying that respondents from the bank did not agree that human risk in Internet banking is risky to use. In comparison, the fourth indicator shows that some respondents were included in the neutral category. Most respondents were neutral towards the disruption of Internet banking services. This is interesting since there are indications that the respondents did not know or were unsure about the absence of Internet banking service disruptions, both overall and partially. The respondents also thought that e-banking sometimes experienced service disruptions during working hours because the database system was limited.

Table 7 System Risk Description

System Risk	Average	Category
Incomplete data	4.23	Disagree
Data input error	3.52	Disagree
Inadequate controls	3.80	Disagree
Service interruption	3.00	Neutral

From descriptive statistical data in Table 8, the average overall item of the external risk variable at the bank was between the range of 3.40–4.19, meaning that the average respondent disagreed that the external risk of Internet banking is a risk. In comparison, the fourth indicator uncovers that some respondents were in the neutral category; some were neutral towards the failure of the outsourcing agreement. This is a concern because there were indications that respondents were not aware of the failure of the outsourcing agreement.

Table 8 External Risk Description

External Risk	Average	Category
External fraud	3.45	Disagree
Fire	3.71	Disagree
Another Disaster	3.69	Disagree
Outsourcing agreement failure	3.21	Neutral
Application of new provisions	3.73	Disagree
Employee riots/demonstrations	3.49	Disagree
Utility failure	3.85	Disagree

Table 9 Legal Risk Description

Legal Risk	Average	Category
Application of know-your-customer provisions	3.46	Disagree
Bank confidentiality	3.78	Disagree
Application of data provisions	3.85	Disagree

Then, descriptive statistical data in Table 9 shows that the average overall item of the bank's legal risk variable was 3.40–4.19. It indicates that the average respondent at the bank disagreed that legal risk in Internet banking is risky. In other words, banking respondents considered Internet banking relatively safe regarding a legal risk.

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Table 10 Research Variable Descriptive Statistics

Empirical Indicators	Min	Max	Std. Dev.
Internal process risk	2	5	0.99
Transaction errors	1	5	0.93
Incomplete documentation	2	5	0.83
Negligence of marketing officers	1	5	0.91
Weak controls	1	5	1
Misinformation	1	5	0.86
Incomplete financial reports	1.33	5	0.92
Human risk			
Occupational health and safety issues	1	5	0.97
High employee turnover	1	5	1.11
Internal deception	1	5	1.07
Disputes between employees	1	5	1.01
Bad management practice	2	5	0.74
Inadequate training	2	5	0.78
Depends on the specific employee	2	5	0.81
Average human risk	1.42	5	0.92
System risk			
Incomplete data	1	5	0.86
Data input error	1	5	0.88
Inadequate controls	1	5	0.77
Service interruption	1	5	1.05
Average system risk	1	5	0.89
External risk			
External fraud	1	5	1.06
Fire	1	5	0.92
Another disaster	1	5	1.02
Outsourcing agreement failure	1	5	0.94
Application of new provisions	1	5	0.92
Employee riots/demonstrations	1	5	0.93
Utility failure	1	5	0.98
External risk average	1	5	0.96
Legal risk			
Application of know-your-customer provisions	1	5	0,2
Bank confidentiality	1	5	0.9
Application of data provisions	1	5	0.87
Average legal risk	1	5	0.89
Overall average	1	5	0.92

Table 11 Crosstab Test Results of Monthly Use of E-banking by Respondents

Usage	RPI		RM		RS		RE		RH	
	Low	High	Low	High	Low	High	Low	High	Low	High
1-3 times	22	23	21	24	19	26	28	17	24	21
%	48.9%	51.1%	46.7%	53.3%	42.2%	57.8%	62.2%	37.8%	53.3%	46.7%
4-6 times	3	19	12	10	10	12	13	9	10	12
%	13.6%	86.4%	54.5%	45.5%	45.5%	54.5%	59.1%	40.9%	45.5%	54.5%
7-10 times	4	8	5	7	4	8	3	9	5	7
%	33.3%	66.7%	41.7%	58.3%	33.3%	66.7%	25.0%	75.0%	41.7%	58.3%
>10 times	11	10	11	10	11	10	11	10	9	12
%	52.4%	47.6%	52.4%	47.6%	52.4%	47.6%	52.4%	47.6%	42.9%	57.1%

The crosstab test results of the banking customer education level in Table 11 reveal a similarity in risk perception at the education level for internal process risk (RPI), human risk (RM), system risk (RS), and external risk (RE). The findings are opposite found at legal risk (RH). Customers with high school and undergraduate education levels perceived this risk as higher.

Table 12 Crosstab Test Results of Education Level of Customer Respondents

Education Level	RPI		RM		RS		RE		RH	
	Low	High	Low	High	Low	High	Low	High	Low	High
JHS	0	2	1	1	1	1	1	1	2	0
%	0.0%	100.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	100.0%	0.0%
SHS	26	40	33	33	29	37	34	32	31	35
%	39.4%	60.6%	50.0%	50.0%	43.9%	56.1%	51.5%	48.5%	47.0%	53.0%
Bachelor	14	18	15	17	14	18	20	12	15	17
%	43.8%	56.2%	46.9%	53.1%	43.8%	56.2%	62.5%	37.5%	46.9%	53.1%

The results of the old crosstab test using banking customers in Table 12 show a similarity in the perception of risk in the use of <1 year for overall risks with similarities. The use of 1–2 years for internal process risk (RPI), system risk (RS), and legal risk (RH) also had similarities. However, opposite results were found for human and external risks (RE). Customers tended to perceive these risks as lower. In the use of 3-4 years, there were also similarities between system, external, and legal risks. Nonetheless, opposite results were uncovered for internal process risk and legal risk, where customers tended to give high scores. For 4–5-year usage, they all had something in common, but at the risk of internal processes, customers tended to assume lower risk, and for use > five years, there were similarities in internal process, system, external, and legal risks, but the results were opposite to human risk.

Table 13 Long Time Crosstab Test Results Using E-Banking

Using Time	RPI		RM		RS		RE		RH	
	Low	High	Low	High	Low	High	Low	High	Low	High
< 1 year	7	10	6	11	3	14	8	9	8	9
%	41.2%	58.8%	35.3%	64.7%	17.6%	82.4%	47.1%	52.9%	47.1%	52.9%
1-2 year	20	32	30	22	25	27	33	19	25	27
%	38.5%	61.5%	57.7%	42.3%	48.1%	51.9%	63.5%	36.5%	48.1%	51.9%
3-4 year	1	7	3	5	7	1	6	2	5	3
%	12.5%	87.5%	37.5%	62.5%	87.5%	12.5%	75.0%	25.0%	62.5%	37.5%
4-5 year	7	5	4	8	4	8	4	8	5	7
%	58.3%	41.7%	33.3%	66.7%	33.3%	66.7%	33.3%	66.7%	41.7%	58.3%
> 5 years	5	6	6	5	5	6	4	7	5	6
%	45.5%	54.5%	54.5%	45.5%	45.5%	54.5%	36.4%	63.6%	45.5%	54.5%

Additionally, the authors need to report the results in sufficient detail so that the reader can see which statistical analysis was conducted and why and, later, justify their conclusions. The crosstab test results of the banking customer education level in Table 13 show a similarity in risk perception at the education level for internal process risk (RPI), human risk (RM), system risk (RS), and external risk (RE). Nevertheless, the results were opposite revealed at legal risk (RH), in which customers with high school and undergraduate education levels tended to perceive this risk as higher.

Table 14 Crosstab Test Results of Education Level of Customer Respondents

Education Level	RPI		RM		RS		RE		RH	
	Low	High	Low	High	Low	High	Low	High	Low	High
JHS	0	2	1	1	1	1	1	1	2	0
%	0.0%	100.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	100.0%	0.0%
SHS	26	40	33	33	29	37	34	32	31	35
%	39.4%	60.6%	50.0%	50.0%	43.9%	56.1%	51.5%	48.5%	47.0%	53.0%
Bachelor	14	18	15	17	14	18	20	12	15	17
%	43.8%	56.2%	46.9%	53.1%	43.8%	56.2%	62.5%	37.5%	46.9%	53.1%

Based on the results of the old crosstab test using banking customers in Table 14, a similarity exists in the perception of risk in using <1 year for overall risks with similarities. The use of 1–2 years for internal process risk (RPI), system risk (RS), and legal risk (RH) also had similarities. However, opposite results were found for human and external risks (RE), where customers perceived this risk as lower. In the use of 3-4 years, there were similarities between system, external, and legal risks. Nonetheless, opposite results were exposed for internal process risk and legal risk, in which customers tended to give high scores. For 4–5-year usage, they all had something in common, but at the risk of internal processes, customers tended to assume lower risk, and for use >5 years, there were similarities in internal process, system, external, and legal risks, but the results were opposite to human risk.

Table 15 Long Time Crosstab Test Results Using E-Banking

Using Time	RPI		RM		RS		RE		RH	
	Low	High	Low	High	Low	High	Low	High	Low	High
< 1 year	7	10	6	11	3	14	8	9	8	9
%	41.2%	58.8%	35.3%	64.7%	17.6%	82.4%	47.1%	52.9%	47.1%	52.9%
1-2 year	20	32	30	22	25	27	33	19	25	27
%	38.5%	61.5%	57.7%	42.3%	48.1%	51.9%	63.5%	36.5%	48.1%	51.9%
3-4 year	1	7	3	5	7	1	6	2	5	3
%	12.5%	87.5%	37.5%	62.5%	87.5%	12.5%	75.0%	25.0%	62.5%	37.5%
4-5 year	7	5	4	8	4	8	4	8	5	7
%	58.3%	41.7%	33.3%	66.7%	33.3%	66.7%	33.3%	66.7%	41.7%	58.3%
> 5 year	5	6	6	5	5	6	4	7	5	6
%	45.5%	54.5%	54.5%	45.5%	45.5%	54.5%	36.4%	63.6%	45.5%	54.5%

Discussion

Operational risk has been among the three most significant types of risks in the financial services industry, and its management is mandated by Basel II regulations. To inform better labor decisions, this paper studies how workload affects banks' operational risk event occurrence (Xu et al., 2022). A separate line of research is the identification of sources and forms of compensation for losses in the event of operational risk realization (Mishchenko et al., 2022). Operational risk is the main source of financial distress in banks (Neifar et al., 2022).

In this study, 1–2 years users perceived internal process risk (RPI), system risk (RS), and legal risk (RH) as higher than human risk and external risk (RE). For 3–4 years customers, there were similarities between system, external, and legal risks. Nevertheless, the opposite result was found for internal processes and legal risks, which customers considered high. For 4–5 years customers, internal process risk was considered the highest risk in digital banking. The higher the education level of customers using digital banking, the higher the level of education of customers using digital banking. They will consider internal and system risks more dominant than legal and external risks.

Based on this study, the description of internal process risks in banking revealed that all indicators had an average value between the range of 3.40–4.19, meaning that banking customer respondents did not agree that internal process risks in Internet banking are risky. In other words, respondents considered Internet banking to be relatively safe. The average banking customer respondent also disagreed that human risk in Internet banking is risky. With this increased dissemination of technology, populations are forced to use digitalized banking for their routine transactions (Kaur et al., 2021).

Further, the second and third indicators demonstrated that the average respondent was included in the neutral category. Some respondents disagreed highly regarding health problems, employee dependence, and bad management practices. This is interesting because there were indications that respondents were less knowledgeable and unsure about the absence of high employee turnover and internal fraud. Bank is indicative of operational risk because it often suggests failure to maintain a strong system of internal control (McNulty & Akhigbe, 2017).

Regarding the disruption of Internet banking services, most respondents were neutral. Digital banking can be defined as a technology-based operating model for exchanging information and carrying out transactions between banks and customers (Nguyen et al., 2020). The primary scope of application of the accord is bank holding companies that are the parent entities within a banking group, internationally active banks, and their subsidiaries, including securities companies (Chernobai et al., 2021). This is interesting since there were indications that the respondents did not know or were unsure about the absence of Internet banking service disruptions, both overall and partially. Respondents also thought that e-banking sometimes experienced service disruptions during working hours because the database system was limited. According to banking respondents, the results of the legal risk variable at the bank considered Internet banking to be relatively safe in terms of legal risk.

Moreover, the crosstab test results of the banking customer education level in Table 23 disclosed a similarity in risk perception at the education level for internal process risk (RPI), human risk (RM), system risk (RS), and external risk (RE). The results were the opposite found at legal risk (RH), in which the respondents to banking customers tended to think the risk was lower. For the use of e-banking for > 5 years, there were similarities in the risks of banking customers: low internal process, system, external, and legal risks.

Conclusion

This research aims to analyze active digital banking users' perceptions of bank operational risks in providing digital banking services. The result exposed that the higher the education level of customers using digital banking, the higher the level of education of customers using digital banking. They will consider internal and system risks more dominant than legal and external risks.

This study only used five indicators of banking operational risk, i.e., process, human, system, external, and legal. This research's banking risk indicators have not included other aspects, such as financial, marketing, and others. For further research, it is suggested to add research variables, not only focusing on Internet banking applications but also on other digital banking products, such as mobile banking, phone banking, and SMS banking.

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