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# FACTORS INFLUENCING DIGITIZATION OF CREDIT RISK MANAGEMENT IN THE MALAYSIAN FINANCIAL INDUSTRY

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## ABSTRACT

The digitization of bank operation processes has emerged as a popular topic of discussion among banks around the world because it will contribute significantly to the growth of the organization. This study aims to examine how customer expectations, regulatory expectations, data management, and advanced analytics influence the digitization of credit risk management in Malaysia's financial sector. Employed workers were the focus of this study due to a dilemma in the industry, where digitization was becoming firmly ingrained in banking strategic approach, with nearly all organizations and operations slated for digital innovations. However, experience has shown that institutional transformations are fraught with risk, as the cost of risk management errors can be exorbitant. In the past, numerous studies have been conducted to analyse the credit process; however, there is a dearth of research on digitalization credit risk management, particularly studies that investigate the relationship between customer expectations, regulatory expectations, data management, and advanced analytics on digitalization of credit risk management. A quantitative research methodology was employed, and data were collected from 106 employed Malaysian respondents. According to the study's findings, customer expectations, regulatory expectations, data

management, and advanced analytics all have a significant bearing on the digitalization of credit risk management. Due to the paucity of research on the interaction between the variables, this investigation will make a significant theoretical and practical contribution. This study can be used as a reference for understanding the external influences that push Malaysian banks to adopt digital credit risk management and, ultimately, stimulate economic expansion.

**Key Words:** Credit risk; Digitization; Bank; Advanced Analytics; Data management

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## 1. INTRODUCTION

Individuals nowadays are part of a technology-enabled population, and digital is already on everybody's mind. According to Chen et al. (2014), over 40% of Asian mainstream-class clients choose online electronic financial services, while about 50% of those under 40 prefer digital banking. Today, digitization of credit risk management is critical to the banking industry's long-term existence. Institutions are being forced to reconsider the cost-effectiveness and long-term viability of existing risk-management models as well as practices due to external and internal constraints. Several of the challenges come from authorities, either from capital markets and competitive threats, as well as from the banks' existing clients, either actively or passively. Customer expectations, regulatory expectations, data management and advanced analytics are all imposing constraints on banks' present business structure.

The failure of Lehman Brothers in September 2008 sparked a global financial market panic. Banks have almost completely stopped lending to one another.

The interest rate on interbank financing increased dramatically to 5%, whereas it was previously near to nothing. Despite efforts by regulators to infuse cash into financial markets, the damage had already been done. The interest rate on government debt has risen even higher, to over 6%. Massive capital investments were delayed, the business sector almost stopped financing, trade credit was difficult to come by, and sales volumes plummeted as demand fell, notably for capital products and industrial durables like vehicles. As a consequence, the global recession has resulted in the greatest and fastest decline in global business growth in contemporary history. The majority of the industrialized economies were in a massive recession in 2009. The ramifications for global trade, both in terms of volume and pattern, have been significant. According to the OECD, global trade volumes could fall by 13% in 2009 compared to 2008 (Corden, 2008). The loan borrowing of banks in 2008 was one of the indirect factors that accelerated the collapse of the economy and financial markets, which may be believed. The rapid expansion of lending to people with bad credit aided in the creation of the housing bubble. Subprime lending was almost non-existent prior to the year 2000, but it exploded after that. Subprime borrowers, who had previously been kept out of the mortgage market, became appealing consumers for mortgage lenders thanks to a continuous rise in property prices and new financial innovations. Lenders designed creative Adjustable-Rate Mortgages (ARMs) based on the belief that home values would grow to climb, with low "teaser rates," no down payments, and some even allowed the borrower to defer some of the interest payable each month and add it to the principle of the loan. Banks' credit stability is essential for growth, thus the appropriate strategy for achieving monetary sustainability is required. When panic struck in 2007, creditors unexpectedly refused to extend their debts, leaving over-leveraged banks vulnerable to collapsing asset values with so little capital.

The crises had a minor influence on the Local banking system since banking institutions had little exposure to US subprime credit products. In the decade since the Asian Financial Crisis, banking institutions have also strengthened and accumulated large buffers. The risk-weighted capital ratio (RWCR) and core capital ratio (CCR) of the banking system were maintained at high levels of 13.1 percent and 10.6 percent, respectively, by the end of 2008. The amount of non-performing loans was at a sustainable level. They peaked at 18.5 percent during the Asian financial crisis but have since fallen to 2.6 percent in 2008. Despite this, the financial system's non-performing loans are likely to rise due to the unfavorable economic climate and a predicted loss of jobs. Overall loan applications in Malaysia have been dropping as local economic activity has slowed. Both corporate and consumer loan requests fell, although applications in the transportation, warehousing, telecommunication, finance, insurance, and business services sectors remained steady. Loan clearances dropped in lockstep with the overall drop in loan applications.

Malaysia's government launched an RM7 billion economic stimulus package on November 4, 2008, to strengthen and revive the market. The monies were distributed to initiatives with a large economic impact, such as infrastructures and buildings. To encourage private spending, workers' contributions to the state-managed required pension fund were decreased by 3% for two years (from January 2009 to December 2010). Furthermore, in December 2008, the central bank dropped the overnight policy rate from 3.5 to 3.25 percent, and in January and February 2009, was further lowered to 2.5 and 2.0 percent, respectively. The loosening of interest rates was meant to encourage the banking sector to keep supplying credit. Puri et al. (2011) investigated worldwide retail borrowing after the financial crisis of 2008 and the impact on bank credit supply and demand. According to the report, there are some loan supply constraints as well as a decrease in loan demand, and this is true for both affected and non-affected institutions. According to the study, affected banks refused more loans than non-affected banks. Even if there were declines, this finding suggests that Malaysian conventional and Islamic banks were less affected by the global financial crisis. This finding demonstrates that Malaysian traditional and Islamic banks were less impacted by the global financial crisis, despite small declines in the 4th quarter that signaled a significant drop in lending, but lending activities quickly rebounded. This demonstrates that commercial and Islamic banks are well-managed in terms of cushioning financial shocks. This finding is supported by Kassim and Shabri's (2010) research, which found that Malaysian banks have extensive experience dealing with financial crises, such as the 1997 crisis. As a result, they will be able to effectively manage the current financial crisis.

Credit risk is a major source of financial volatility in the banking system, according to the Bank for International Settlements (2000). As a result, assessing credit risk in financial systems is critical. Financial institutions have had problems for a variety of reasons over the years, but the main cause of serious banking problems remains permissive borrowing benchmarks for borrowers and trade creditors, weak asset allocation risk management, or insufficient attention to changes in the economic or other conditions that can ultimately lead to a degradation in a bank's counterparties' creditworthiness (Gil Diaz, 1997). A bank's primary job is borrowing, and debts make up the majority of its assets. In uncertain economic circumstances, bank borrowing costs are quickly outpaced by inflation, making it harder for borrowers to pay back loans as real earnings decrease, insider loans rise, and overconcentration in specific portfolios rises, increasing credit risk. In Mexico, banking collapse has been blamed on bad lending practices, a lack of experience, and insufficient organizational and information mechanisms to properly analyze credit risk in a slumping economy (Gil Diaz, 1997). The same may be said about Kenya's financial crisis in the 1980s and Spain's banking crisis in the

1990s. The core activity of the banking system, according to Marrison (2002), is not deposit mobilization and loan provision. Customer default is reduced through effective credit risk management. They go on to say that a bank's competitive advantage is based on its ability to handle credit responsibly. The failure of a bank is primarily considered the result of mismanagement due to improper loan decisions made with incorrect credit status assessments or the payment of non-performing loans, as well as an excessive concentration on giving loans to specific customers. According to Goodhart (1998), bank failure is caused by poor credit risk management, which leads to excessive credit risk. Credit risk management is essential for banks, and it is also an important part of the loan process. Credit risk management aims to maximize the bank's risk-adjusted rate of return by limiting exposure to credit risk in order to safeguard the bank from the detrimental consequences of credit risk. Regulators' challenges, investor expectations, the advent of new competitors, and market expectations of becoming able to obtain money and make loan applications through a number of programs all put lenders at risk. It is quite viable for financial institutions to implement digital risk management technologies in order to solve all of these issues. Digitization can substantially improve credit risk management.

Using modern technological channels and online loans, the digitalization of decision-making procedures and diverse activities helps to sustain a customer base and grow the finance industry. In general, this helps banks become more efficient and competitive, as well as reduces the time it takes to provide client care (Ruinan, 2019). For retail credit procedures, digitization has become the norm. Personal loan applications may now be submitted with only a few swipes on a smartphone, and the time it takes to receive funds can be as little as a few minutes. Due to legal limits, mortgage lending is more complicated, but banks in several developed economies have managed to digitize substantial portions of the mortgage process. Several banks have established a goal of automating 95 percent of retail screening decisions. SME financing has become a digital focus for banks. The reasons behind the high costs are obvious, and there are substantial opportunities to improve customer experience. In addition, both conventional businesses and fintechs already provide compelling digital SME loan offerings, with significantly faster approval and payout timelines. Corporate lending is also improving in terms of digitalization, though given the relatively low trading volumes in this category, corporate banks are moving with more prudence and less hurry. Rather than overhauling the whole client experience, banks are improving standard operations like digitizing credit application papers and automating annual evaluations to enhance both times to yes and "quality of yes." (Chappell et al., 2018). Risk profiles are more transparent as a result of the digital revolution in credit risk management. Banks may be able to increase their company by using more focused risk-based pricing, faster client services without sacrificing risk levels, and a more efficient portfolio if they have a

stronger grasp on risk. Customer expectations for digitized management services, regulatory expectations for a high-performing risk function, and the increasing significance of strong data management and advanced analytics are three fundamental pressures on banks' business models that are directly related to credit risk management.

From the standpoint of finance theory, bank management entails the management of four major financial statement risks:” liquidity risk, interest rate risk, capital risk, and credit risk” (Hempel et al, 1990). Credit risk is widely regarded as the most significant risk in terms of the impact on the performance of banks (Sinkey, 1992, p.279) and bank failure (Sinkey, 1992, p.279) as cited by Boffey (1995). The fact that banks have a limited ability to absorb loan defaults is one of the most essential reasons for proper credit risk management. In general, a bank's ability to withstand a loan deficit is derived in two ways: first, from income generated by other successful loans, and second, from bank capital. The amount of money a bank makes from successful loans is usually small. Due to the anomalous loan losses that resulted from reckless lending practices in the late 1980s, bank credit risk management has received a lot of attention recently. In general, a bank's ability to withstand a loan deficit is derived in two ways: first, from income generated by other successful loans, and second, from bank capital. The amount of money a bank makes from successful loans is usually small. Due to the anomalous loan losses that resulted from reckless lending practices in the late 1980s, bank credit risk management has received a lot of attention recently. There have been two primary points made regarding these different systems. The first is that in order to attain optimum asset performance gains, their use should be integrated. The second point is that, whereas these systems are required, they are insufficient to ensure credit risk management integrity within a bank. The building and maintenance of a high credit culture that pervades the whole bank, from the management board down to the credit officer handling a portfolio of loans, was important to the achievement of bank credit management.

Banks are being forced to reconsider the cost-effectiveness and long-term viability of their risk-management models and practices because of outside and internal pressures. Risk and compliance accounted for around 10% of overall banking costs in 2012; in the future year, this figure is likely to climb to around 15%. Due to extra capital needs, fines, and trailing cost effectiveness, banking's return on equity stays below the cost of capital globally. All of this adds to the pressure on managing risk, which is becoming increasingly difficult for banks to minimize risk by gradual gains in the risk management system. Most banks started with retail payment procedures, which offer the greatest opportunity for efficiency gains. Well-established online shops can more quickly implement digital strategies: mobile

applications, for example, can be created to allow the instant creation of personalized private loans at the point of sale. Banks have lately begun to reap productivity improvements in the SME and commercial banking sectors by digitizing critical credit process steps, such as credit decision engine automation. Credit process automation and digitization of key elements in the credit value chain can result in cost reductions of up to 50%. The advantages of digitizing default risk extend far beyond these enhancements. Digitization can also help banks secure their revenue by lowering leakage by 5 to 10%. (Bahillo et al., 2016). However, because of a paucity of research in this field, the effects of the three key aspects on the transformation of credit risk management into digitization have not been empirically examined. As a result, the goal of this study is to help financial institutions and academics better comprehend the elements of consumer expectations, regulatory expectations, data management and advanced analytics as they relate to the current financial industry's digitization of credit risk management.

## **2. LITERATURE REVIEW**

The progress of digitization has both metaphorical and physical components. Digitization is the process of converting analog signals into bits, which are represented as 1s and 0s. As a result of digitization, data can be presented in a variety of forms, on a variety of materials, and in a variety of systems. Transistors, or devices that enhance and transmit electrical impulses, are at the heart of digitization in today's computing. A single CPU can currently fit billions of transistors made of semiconducting materials like silicon crystals. In the 1950s and 1960s, the invention of transistors transformed electronics, as the new devices replaced bulky, expensive vacuum tubes (Kreiss and Brennen, 2016). Digitalization is one of the most fundamental ongoing transitions to the new society, affecting many aspects of business and daily life. This transition is significant for retailing, both which influences and is influenced by it.

Credit risk refers to the probability that the real return of an investor or loan will differ from the expected profit (Conford, 2000). Credit risk, according to Coyle (2000), is defined as losses resulting from credit clients' reluctance or incapacity to pay their debts in full every month. Limited capacity, inappropriate credit policies, volatile bond yields, incompetent governance, improper laws, reduced capital, and liquidity levels, directed loaning, massive bank licensing, bad loans capital raising, reckless lending, poor credit assessment, no non-executive directors, poor loan underwriting, laxity in credit assessment, poor lending practices, government interference, and insufficient insight by the federal government are the major causes of default risk. To reduce these risks, the financial system has to have well-capitalized

banks, a diverse customer base, sharing information about consumers, interest rate stability, a decrease in non-performing loans, higher deposit accounts, and increased credit supplied to borrowers. The number of loan defaults and nonperforming loans must be minimized (Laker, 2007; Sandstorm, 2009). The essential concepts in credit risk management are, first and foremost, the formation of a defined hierarchy, the assignment of responsibility, the prioritization and rigor of procedures, the clear communication of tasks, and the assignment of responsibility (Lindergren, 1987). The predominant worry about bank management of credit risk, according to Demirguc-Khunt and Huzinga (1999), is dual. First, there is the Newtonian reaction to credit losses, which is the understanding that the failures are intolerable after they have occurred. Second, the latest events in the fields of commercial paper lending, restructuring, and other non-bank competition have compelled banks to seek out potential loan customers. Strong and growing corporations have shifted to a number of options available sources of finance, such as the bond market, as a result of this. Planning and administering the loan function in a competent and best can help to reduce losses, regardless of the level of risk taken. When it comes to risk management, banks might use highly complicated testing methods (Gill, 1989).

## **2.1 Customer Expectation**

Preliminary ideas about just a good or service are known as customer expectations (Olson & Dover, 1979). Prior expectations of service will be utterly dispersed in the absence of knowledge. Customers, on the other hand, have several information sources that contribute to expectations of future service interactions with such a specific organization. Past experience with the product, word of mouth, professional opinion, publicity, and company-controlled communications (e.g., advertising, personal selling, and price), as well as prior exposure to competitor services, are all examples of these sources (Zeithaml et al., 1993). Expectations impact customer decisions about the type of product or service to buy during the pre-purchase stage. The mood of service employees, other customers, and equipment can all have an impact on usage. Expectations are formed in the post-purchase period based on satisfaction ratings (Oliver, 1980). Providers must recognize client demands in order to fulfill objectives and deliver high customer satisfaction during the service encounter, according to Parasuraman et al. (1991). Parasuraman et al. (1985), Parasuraman et al. (1988), and Van Pham & Simpson (2006) found that expectations are a primary factor of a consumer's service quality assessments and satisfaction. Client expectations, on the other hand, are complex and variable, and service providers should develop a clear understanding of how to provide appropriate services in light of various



customer expectations. For example, service providers might create a framework to promote the process of their operational strategy so that they can supply exactly what their customers want in response to changing customer expectations. In other words, specific techniques for providers to use existing findings to build customer service plans that can assist their organization in increasing the level of customer satisfaction are urgently needed.

Richard Nyangosi et al. (2014) investigated how online, and smartphone technologies have gained traction in recent years and are changing how all processes, especially financial services, work. Economic service companies, such as banks, are embracing technology. In essence, market situations and circumstances have made it necessary for them to be implemented in order to match customer needs. Kumbhar (2011) examines the primary elements influencing consumer happiness in e-banking service contexts (i.e., quality of service, perception of brand, and perceived value). In addition, the study looks at how the service quality impacts perception of brand, perceived value, and satisfaction in e-banking. Banks provide credit to borrowers with the expectation of receiving the funds plus interest. Non-performing loans (NPLs) are loans that banks believe would result in a loss of money if consumers do not pay their monthly installments.

The shift in customer expectation is based on the idea that the seller of a product should be able to predict obvious and undiscovered needs (Blocker et al, 2011). Since financial services are positioned as the 4th most digitalized sector of the economy due to a high amount of knowledge about its customers, these needs can be studied and met by incumbents using large amounts of data stored in CRM systems (Manyika, 2016). Because of the preference for detailed information analysis from social networks, mobile data, and other aggregated data sources, big data allows banking clerks to evaluate the whole client profile before choosing credit terms. This method enables the creation of a psychological profile of future consumers in order to estimate their payment capacity, as well as increase clerk efficiency and effectiveness. As a result of these shifts, new business models emerge. Thus, we hypothesize that:

H1: There exists a significant relationship among customer expectation and the digitalization of credit risk management.

## **2.2 Regulatory Expectation**

More lately, an institutionalist perspective has arisen, which examines how governance functions in specific situations while taking into account both opposing viewpoints. Technical competence, in this view, is inadequate for regulation legitimacy, since many choices entail judgments and balancing between interests (Prosser, 2004). We adopt an institutionalist viewpoint to this research, which allows us to look beyond the narrow lens of

independence, regulator independence, and state capture to evaluate the complexities of actual judgments. The knowledge and modeling of the greater "regulatory space," which encompasses not just the regulated and the regulated, but also the state and the complete cast of supporting characters, including stakeholders, is a major feature of this method (Hancher and Moran, 1989).

Intensification collaboration between both the government and business, especially in the banking sector, where the regulator has significant authority, is one of the key factors ensuring the digital economy's rapid expansion and contribution to the country's GDP (Kudryavtseva, 2018). To properly address these difficulties, banks and regulators must establish a solid commonality for cooperation in the digital world, which is now lacking (Klochkov et al., 2016). It is worth noting that the government has put in place adequate safeguards against the hazards that come with digitization, most importantly cyber-security and digital identity difficulties (Alasas et al., 2017). In the context of the new, digitized business models, regulators want the risk department to take a more active role. New laws are being implemented to address cyber risk, control robotics, and risk data aggregation challenges. Data management and the quality and timeliness of the data utilized in stress testing are specified in directives relevant to the Comprehensive Capital Analysis and Review, BCBS 239, and asset-quality reviews (Bahillo et al., 2016). As a result, we propose the hypothesis as follow:

H2: There exists a significant relationship among regulatory expectation and the digitalization of credit risk management

### **2.3 Data management and Advanced Analytics**

The rising use of digital banking services by customers, as well as the resulting data, creates new opportunities and hazards. Banks can, for starters, incorporate data sources and make them accessible for risk modeling. This can improve the visibility of shifting risk levels across the board, from people to sections to the entire bank. Second, because banks acquire financial and personal data from their customers, they are required to address privacy issues and, in particular, to defend against security breaches (Bahillo et al., 2016). Sheng et al. (2017) investigated the idea of big data in management and noticed value generation methods from data in a variety of settings, including organization, operations, and marketing data management. However, they only defined the application domains, not the general data management process that transforms data into applications. The NIST Big Data Public Working Group has created a data life cycle strategy to help with this. Collecting, planning, evaluation, and execution are the 4 stages of this process paradigm. The final level "involves processes that generate value using the synthesized knowledge" (Chang & Grady, 2015). The NIST large data reference model (Chang & Fox, 2015) embodies this value generation in

the type of data users, for whom accessibility to analysis and display of analytics results have the greatest value in both the information and IT value chains. "The fundamental value from large data comes not from data in its raw form, but from the analysis and processing of it, as well as the ideas, goods, and solutions that arise from analysis," said Davenport & Dyché (2013).

Because of the orientation of key plans for risk control, the timely identification and reporting of sources of uncertainty from targeted intervention, and the application of specific actions to enhance achievement, the volume of acquisition of data through digital technologies and the multi-channeling with the adaptation of Big Data Analytics could endorse the maximization of international value of business (Dicuonzo et al., 2019). Data sourcing tools find data quickly, accurately, and completely; information retrieval and retainment tools efficiently store and process data and support historical analysis; data research and data reporting tools perform focused to determine and reporting results; data management tools handle access to data, stockpiling, allocation, and reliability; and data governance tools govern and control data with reassurance (Krishna, 2016). The literature shows how "Big Data" could be a critical component of regulation and supervision, particularly in lending institution predictive modeling. Risk management, particularly credit and reputational risk management, might be improved with BDA technologies, allowing the bank to make better use of its massive amounts of data and extract more exact, detailed, and factual data. Real-time implementation can assist risk managers in identifying, assessing, and mitigating risks in a much faster and more precise manner, as well as extracting latent value from data leveraging new data quality. Monitor indicators that are helpful for risk typologies that are not quantitative. Because of the size and complexity of data produced by the bank's innumerable daily transactions in its operational systems, investment plans will progressively be directed toward artificial intelligence-based technologies that can rapidly process vast amounts of data and derive the valuable information from "Big Data", having returned useful information that can be used in real-time.

With the new surge of powerful data analytics tools, banks are now able to access and issue loans to customers who were previously considered too hazardous. Customers can also make use of the credit possibilities provided by financial firms. From the perspective of the customer, the loan approval procedure is becoming more fluid and quicker, with a shorter return time, resulting in a better client experience. To keep ahead of the pack, banks can use big data technologies and analytics to constantly evaluate their clients' performance, allowing them to reduce risk and develop past opportunities. Banks can build their clients' financial profiles utilizing traditional sources of

data like spending and payment trends, as well as non-traditional sources of data like social media postings and branches or call center interactions. Rather than depending on diverse and fragmented sources, all of the necessary data is collected in one place, allowing for more efficient and optimal credit managerial decisions. Lending strategies and processes for choices and vulnerability assessments can be implemented using analytical techniques. While analytics offer genuine insight into client behavior, they also supply banking firms with information about the variables that have impacted their changing buying patterns and habits. With this information at their fingertips, lenders can better adapt their services and connect their credit offerings with their consumers' demands. Thus, we hypothesize that:

H3: There is a significant relationship between data management and advanced analytics and the digitalization of credit risk management.

### 3 DATA AND METHODOLOGY

The majority of the target respondents in this study came from the financial and insurance industries, based on 106 responses, but there were also some employees from other industries working in Malaysia, such as construction, education, information technology, healthcare, media and entertainment, and oil and energy. This study's Cronbach alpha values are shown in Table 1 below. According to the testing results, the independent and dependent variables range from 0.731 to 0.854. The appropriate range, according to Tavakol and Dennick (2011), is 0.70 to 0.95. As a result, the materials from the independent and dependent variables are clearly reliable.

**Table 1:** Cronbach's Alpha

<b>Variables</b>	<b>Value</b>
Independent Variables	
Customer Expectation	0.854
Regulatory Expectation	0.801
Data management and advanced analytics	0.759
Dependent Variable	0.731
Digitizing Credit Risk Management	

The normality test determines whether the sample data is from a normally distributed distribution. Skewness and Kurtosis are used to determine whether something is normal or not (Shahid & Sattar, 2017; Shahid et al., 2018; Shahid et al., 2021). Skewness is an asymmetry measure, whereas kurtosis is the height and sharpness of the center peak measure (Hopkins & Douglas, 1990; Shahid, 2019; Shahid, 2022). Table 2 shows how both the IV's and DV's in this study were measured for skewness and kurtosis. Customer expectation (CESum) has a skewness statistic of -0.156 and a kurtosis statistic of -0.40, regulatory expectation (RESum) has a skewness statistic of -0.54 and a kurtosis statistic of -1.30, and data management and

advanced analytics (DASum) has a skewness statistic of 0.20 and a kurtosis statistic of -0.456. Digitizing credit risk management (DCSum), the study's dependent variable, has a skewness metric of -0.601 and a kurtosis metric of 0.863. George and Mallery (2016), all say that values between -1 and +1 are good, and values between -2 and +2 are outstanding. All the numbers in this study fell between -1.30 and 0.863. So, both the independent and dependent variables in the study are spread out in a regular way.

**Table 2:** Descriptive Analysis

Variables	Min	Max	Mean	Std Deviation	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
CESum	6.00	25.00	16.9811	3.85939	-.156	.235	-.040	.465
RESum	8.00	25.00	17.3585	3.44532	-.054	.235	-.130	.465
DASum	8.00	25.00	16.9057	3.83599	.020	.235	-.456	.465
DCSum	7.00	25.00	18.6887	3.49520	-.601	.235	.863	.465
Valid N=106								

Table 3 depicts the correlation analysis used in this study to determine if there is a significant link between the independent variables and the dependent variable. According to the test, all variables have a moderate positive relationship as the correlation coefficients are between 0.3 to 0.5.

**Table 3:** Correlation Analysis

		CESum	RESum	DASum	DCSum
CESum	Pearson Correlation	1	.873**	.939**	.432**
	Sig. (2-tailed)		.000	.000	.000
	N	106	106	106	106
RESum	Pearson Correlation	.873**	1	.897**	.424**
	Sig. (2-tailed)	.000		.000	.000
	N	106	106	106	106
DASum	Pearson Correlation	.939**	.897**	1	.306**
	Sig. (2-tailed)	.000	.000		.001
	N	106	106	106	106
DCSum	Pearson Correlation	.432**	.424**	.306**	1
	Sig. (2-tailed)	.000	.000	.001	
	N	106	106	106	106

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The model summary table summarises the model's and dependent variable's relationship strengths. The linear correlation between the observed and model projected values of the dependent variable is represented by R. Strong relationships are indicated by large values (Skosana et al., 2021). The R square is 0.336, indicating that the independent variables of customer expectation, regulatory expectation, data management and advanced analytics accounted for 33.6% of the variation in impacting credit risk management digitalization in the Malaysian financial industry.

**Table 4:** Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.580 <sup>a</sup>	.336	.317	2.88874

a. Predictors: (Constant), DASum, RESum, CESum

b. Dependent Variable: DCSum

Table 5 displays the sum of squares for the regression and residual models, as well as the df value, mean square, F value, and significance for the regression analysis of variance. As a result of the analysis, the F value for this study is 17.239, and the significance value is 0.000. Considering the p-value was less than 0.05, the slope of the regression line would not be zero, indicating that the regression model was just a great match for the dataset and that the dependent variable and independent variables had a significant linear connection.

**Table 5:** ANOVA Analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	431.556	3	143.852	17.239	.000 <sup>b</sup>
	Residual	851.170	102	8.345		
	Total	1282.726	105			

a. Predictors: (Constant), DASum, RESum, CESum

b. Dependent Variable: DCSum

Table 6 demonstrates that customer expectation has the largest beta value of 1.067 with a significance value of  $p=0.000$ , implying that customer expectation has the biggest influence on credit risk management digitalization in the Malaysian financial industry. Furthermore, regulatory expectation has the second-highest contribution with a beta value of 0.596 and a significance value of  $p=0.02$ , and data management and advanced analytics have the lowest contribution with a beta value of -1.230 and a significance value of 0.000. The significant value reflects to what extent the three independent variables influence to the predictions of the study's dependent variable. As a result of the findings in Table 6, customer expectations, regulatory expectations, data management and advanced analytics have significant values, which range from 0.000 to 0.002, showing that they have a strong relationship with digitizing credit risk management.

**Table 6:** Regression Coefficient Analysis

Model	Unstandardized B	Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
<b>1 (Constant)</b>	10.739	1.452		7.398	.000
CESum	.966	.217	1.067	4.451	.000
RESum	.605	.189	.596	3.201	.002
DASum	-1.121	.241	-1.230	-4.653	.000

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a. Dependent Variable: DASum

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#### 4 RESULTS AND DISCUSSION

The hypothesis testing for this study is shown in Table 7. When the significance value is  $p < 0.05$ , the hypothesis is considered significant. According to the findings of the correlation test analysis of the multiple regression analysis, the significant value of customer expectation is 0.000, regulatory expectation is 0.002, and data management and advanced analytics is 0.000. Three of the variables were acceptable because the value was less than 0.05 for H1, H2, and H3. As a result, there is a strong connection between customer expectations and credit risk management digitization in Malaysia's financial industry. Furthermore, there is a strong connection between regulatory expectations and credit risk management digitization in Malaysia's financial industry. Finally, in Malaysia's financial industry, there is a strong connection between data management and advanced analytics and digitizing credit risk management.

**Table 7:** Hypothesis Testing

Hypothesis	Significance	Findings	Results
H1: There is a significant relationship between customer expectations and the digitalization of credit risk management.	0.000	$p < 0.05$	Hypothesis Accepted
H2: There is a significant relationship between regulatory expectation and the digitalization of credit risk management	0.002	$p < 0.05$	Hypothesis Accepted
H3: There is a significant relationship between data management and advanced analytics and the digitalization of credit risk management.	0.000	$p < 0.05$	Hypothesis Accepted

According to the findings of this study, there is a significant relationship between consumer expectation and digitalization credit risk management in Malaysia's financial industry. This is supported by studies done by Chen et al. (2014); and Nyffeler and Kurt (2014) all investigated customer expectations on digitizing credit risk management, and the findings for each of these research suggest that the two factors are related. Customer expectations are undeniably crucial in the digitization of credit risk management. As a consequence of this study, it was discovered that there was

a meaningful relationship between consumer expectations and credit risk management digitization in Malaysia's financial industry.

Morales and Trinidad (2019) performed the study to evaluate the factors of behavioral intentions to adopt the digital mortgage service of bank from the standpoint of about 250 mortgage consumers who are present or potential the users of the bank's digital mortgage service. Ideally, Researchers divided consumer behavior into three categories: performance expectation, effort expectation, and social influence on clients' adoption of digital mortgage services. Customer performance behavioral intentions were shown to be properly connected with digital mortgage services, according to the findings of this study. Convenience, ease of use, time efficiency, technical understanding, and technical assistance, on the other hand, play a key part in meeting clients' expectations for digital mortgage services. The digitalization of end-to-end credit processes, including all customer satisfaction and related credit operations, was previously a deep result of a major focus for banks across the globe. Most customer relationships revolve around credit and digitizing it provides major benefits to both banks and customers (Chappell et al., 2018).

Prior articles stated that in order to achieve customer retention in the financial industry, innovative solutions and exceptional service are considered necessary. The main objective is for financial institutions to be able to identify potential risks and return from consumers for future demand, as well as enhance consumer experience (Valenduc and Vendramin, 2017). According to Sola et al. (2015), customers seek greater interaction and collaboration, as well as a true user experience, when dealing with financial institutions. The financial industry's organizations must facilitate the digital user by developing and improving relevant internal processes and systems. Innovative products and exceptional service are essential in the financial sector, particularly among banking institutions, to establish consumer loyalty. This study shows that customer expectations are the most important factor in implementing digitization in bank credit risk management. Realizing that Malaysia, and the rest of the globe, are becoming increasingly digitally mastered, the simplicity with which clients can switch banks will enhance customer expectations (Heffernan, 2005). Furthermore, the spread of internet growth and technological consumption in Malaysia has made it appropriate for banks to match client expectations in terms of banking service delivery. Consumers in Malaysia prefer to perform banking operations using digital devices, particularly Generation Y, which could be a good indicator of why this variable has such a big impact on digitalization credit risk management. Regulatory expectations have an impact on the digitalization of credit risk management, according to a number of previous research. According to the findings of the data study, there is a significant connection between regulatory expectations and credit risk management digitization in Malaysia's



financial industry. These include assuring the supervisory body's continued efficacy and assisting the risk function in better addressing regulatory expectations in critical areas such as risk assessment, consolidation, and reporting through the use of technology. Furthermore, according to studies by Nitescu & Duna (2018), the primary reasons for digitizing and enhancing the credit process include operational efficiencies, rising standards, transparency, better credit decisions, and increased customer satisfaction and regulatory considerations. Studies show that in addition to policy shifts, regulation, and supervision adjustments, digitalization and financial technology have an impact on every aspect of banking institutions. Alongside great authority comes great responsibility when it comes to the constructive technological and digital development of the banking sector and financial markets. Authorities and regulators are continually attempting to rebalance the "game's" guidelines in order to sustain the influence of breakthrough technology on the real-world underlying economic system. Regulatory expectations are a significant component that influences banks' evaluation risk management; as a result, they can serve as a powerful incentive or discourage bank credit risk from transforming toward digitization. Regulatory expectations were shown to be extremely significant in banking, particularly when implementing technological advances, and the new policies may well have a favorable effect.

Financial authorities and the Federal Reserve, according to prior reports, have such a contribution to make in recognizing and adjusting to technological adoption in the banking credit process. Technology innovation expansion in aspects like the rising utilization of non-traditional data in credit management practices, in combination with advanced algorithms as well as sophisticated technology like artificial intelligence and machine learning in the financial sector, would probably have a substantial impact on the Federal Reserve's mandate to ensure banking system safeness and soundness and overall creditworthiness (Jagtiani and Lemieux, 2019). The outcomes of this research are similar to the bulk of previous research findings, which show a positive and significant association between regulatory expectations and digitalization credit risk management.

Banks can use a variety of information sources and situations to forecast their clients' financial health. In areas including card fraudulent activities, securities fraud compliance, creditworthiness, stress-testing, and cybercrime predictive analysis, data management and analytics may help increase risk assessment. However, the accessibility of big data instruments, authentic analysis, reliability, visualization, cost, accessibility, information security, and privacy issues have all been identified as major constraints of big data approaches. According to previous research by R. Kitchin (2013), a town's services and environments grow reliant on software and functionality. While

this may aid towns in resolving urban difficulties, it also exposes communities to potential vulnerabilities, perhaps exposing them to new threats. These software systems have become much more complicated and interconnected day after day, making it increasingly difficult to create stable, reliable, and secure technologies and infrastructure (Kitchin, 2013). In addition to getting more complex, these systems are becoming increasingly vulnerable to criminal attacks. In addition, the various gadgets that compose the Internet of Things, including mobile phones and tablets, are similarly vulnerable to direct penetration in the area of information loss or destruction to the users. The ongoing introduction of advanced operations, which will involve ever-changing capabilities and expose banks in the industry to expenses that would expand throughout the period, is similar to the study carried out. This puts uncertainty into the assessments of its decision-making entities, which are pushed to establish intricate programmatic threads in order to prevent the unknown risk of a screeching halt in their future development. In an interconnected world, big data analytics also has the potential to improve cyber security safeguards. These options, however, must take into account issues of personal privacy.

Tene and Polonetsky (2013) found that when most confidential information is collected, the adoption of common practice analytics leads to an increase in privacy issues. As the obtained information is replicated and given to a diverse variety of entities, privacy and security become more challenging. Personal information, in particular, is difficult to retrieve once it has been exposed due to its transient nature. On the other side, it could expand digital control, hence why online platforms as well as free speech advocates have been vocal in their opposition to the proposal. As a consequence, data management and advanced analytics variables may appear to have a negative relationship with digitizing credit risk management, as the more advanced data management and analytics may encounter more risk or rather compassion toward the banking sector, potentially leading to increased concern among banks to digitize their credit risk management.. Issues get much worse when it comes to digital data management and advanced analytics; most outdated systems can't keep up with the increased workload. Using an obsolete infrastructure to gather, process, and assess sufficient streams of information can jeopardize the reliability of the system. As a result, banks may be forced to expand their processing capacity or entirely restructure their infrastructure in order to address the problems. The results of this study show that data management and advanced analytics have had a negative effect on the digitization of credit risk management. The outcomes of this study are consistent with previous research, which found that data management and advanced analytics have a strong relationship with credit risk management digitization.

## 5 CONCLUSION

The goal of this research was to see if consumer and regulator expectations, as well as data management and advanced analytics, had an influence on credit risk management digitization in Malaysia's financial industry. In this research, 106 responses were obtained from Malaysian individuals who were employed. Later, using the Statistical Package for Social Sciences (SPSS) software, the data received from the respondents were subjected to numerous tests. Furthermore, the results of this study showed all independent variables that had an influence on the dependent variable, which was digitization credit risk management. The independent variable data management and advanced analytics, on the other hand, have a detrimental influence on digitalization credit risk management. As a consequence, all of the independent variables' hypotheses were accepted. As a result, data management and advanced analytics had a negative beta value, indicating that the independent variables will move inversely with the dependent variable. According to the result of this research, further intelligence of data management and advanced analytics will bring much more concern toward the intention of the banks of digitizing credit risk management.

From a practical perspective, this research will aid local bank management in better understanding their credit risk process. Credit risk managers, in particular, can comprehend the expectations of consumers and regulators in terms of credit risk management with regard to digitalization. In the hopes of better implying a digital advancement in customer procedures, they will also go further into the credit risk value stream to look for chances to add value via digitization. Furthermore, this research will aid the regulator, particularly the Ministry of Finance, in a deeper understanding of the digitalization of bank credit risk operation, and it might serve as a resource for them to determine a regulatory regime for digitals inside a jurisdiction. The techniques range from using the standard banking regulatory structure to creating a specific set of laws, including a licensing regime, to regulate the digitalization of banks' credit processes. Customer expectations were shown to have the greatest influence on the digitization of credit risk management in this research. As a result, this study clearly draws attention to the fact, that both the banking industry and the authorities should establish new strategies and rules to successfully approach consumer satisfaction while minimizing risk. Besides that, numerous respondents conveyed their expectations of secure and private information as credit risk management becomes more digitalized; as a result, this study will be used as a framework and all banks could perhaps attach importance to building new functionality across the organization and close cooperation among the company's management, operational processes, and corporate entities, their own approach, and

perhaps even their policies that are better suited for compliance with regulations and the effectiveness of their implementation and operation. The Malaysian Ministry of Finance must address that issue by developing standards for the digitalization of credit risk management in the financial industry. This research intends to provide enough information to the company in the financial industry to enable them to adjust quickly to changes in consumer preferences, innovation data, and analytic, and regulatory contexts, as well as increased risk profile exposure. With a better handle on risk, banks in Malaysia may be able to expand their operations through more focused risk-based pricing, rapid service delivery without sacrificing risk levels, and much more appropriate asset allocation.

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