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The Influence of Technology Acceptance Model (TAM) on Disaster Management in Indonesia via The Twitter Platform

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ABSTRACT

The rapid progress of information technology systems influences disaster management, for example Twitter is used in Indonesia for disaster management. The purpose of this research is to determine the influence of technology with the variables subjective norm, image, output quality, result demostrability, perceived usefulness, perceived ease of use, use of Twitter, information accessibility, adaptability, resilience, and proactiveness to provide an overview of the disaster management situation. The research was conducted using a questionnaire method and convenience sampling technique on Twitter social media users, obtaining 150 respondents. The research applies the PLS-SEM version 4.0.9.9 SmartPLS method. The research results show that all research variables have a positive effect on disaster management. The research carried out can provide an overview of the disaster management situation by utilizing technological information.

INTRODUCTION

Globally, information technology and social media platforms have attracted the interest of individuals and organizations of all sizes. In general, social media is a tool that allows users globally to create and share information virtually from one individual to another (Kavota, Kamdjoug and Wamba, 2020). This is used as a very fast data channel between various users and various locations which is used in disaster management, helping to detect events that occur socially. For emergencies or disasters social media can be categorized into two, that is as a

distributor of information and receiving input from users. social media platforms (Kavota, Kamdjoug and Wamba, 2020).

Managing disasters is very important because they can threaten organizational goals and can cause permanent damage. Issues that arise in disaster management are the need for a common platform to support the smooth flow of information and the lack of an integrated system to support emergency activities (Dorasamy, Raman and Kaliannan, 2013). Disaster management can be a more proactive solution so that disaster management needs must be implemented.

Twitter is a social media platform that has the potential to provide information and management due to its convenience and instant and simple nature. This social network has monthly active users of around 313 million monthly active users, with an active percentage of 82% using mobile devices (Martínez-Rojas, Pardo-Ferreira and Rubio-Romero, 2018). Twitter indirectly influences traditional media agenda setting, especially at events, because journalists gather information from tweets and tweets between fellow users (Ruz, Henríquez and Mascareño, 2020).

Social media is often referred to as a communication channel for sharing, disseminating and communicating information when a disaster occurs (Shan *et al.*, 2019). Social media has an important role in timely disseminating emergencies and gathering feedback from affected populations. Evacuation plans, modes, and options depend on many different factors. Information from social media about conditional awareness can influence decision making (Roy *et al.*, 2020).

This topic is considered important because it concerns the continuity of life where the speed of information available through social media can reduce, prevent or speed up handling when natural disasters occur. Information that is disseminated sooner or later will influence the response and actions that will be taken. Many researchers have studied the relationship between social media and disaster management and have highlighted the benefits of using social media platforms.

The use of Twitter as a medium for disseminating information for disaster management in Indonesia. Twitter is one of the largest social media platforms in the world which can provide actual information. This research involves Twitter users in Indonesia as the main sample in implementing Twitter as a platform for disaster management. The aim of this research is to examine the variables that are the main factors in implementing Twitter as a disaster management media so that this research can be a reference for all groups when facing disaster situations.

LITERATURE REVIEW & HYPOTHESIS

Technology Acceptance Model (TAM)

The technology acceptance model (TAM) found that there are three influencing factors, that is explaining, predicting, and controlling the number of requests (Holden and Karsh, 2010). Apart from that, the technology acceptance model also explains individual attitudes and behavior towards a device or technology system used (Dönmez-Turan and Kir, 2019). The main purpose of the technology acceptance model (TAM) is to predict new adoption of technology among users and to look at information system design problems that arise before use becomes commonplace or feasible among users (Kamal, Shafiq and Kakria, 2020).

Technology Acceptance Model (TAM) 2 described as that there is a relationship between the user/mental/judgment of suitability made between goals in the workplace and the

consequences that exist in carrying out work using a technological system (Venkatesh & Bala, 2008).

Innovation Diffusion Theory

According to Rogers (2003) diffusion is a process of innovation that is communicated through certain channels over time with members of a social system. Innovation is an idea, practice, or object that is considered new by individuals or other units, so innovation diffusion refers to the process of spreading new ideas, products, and current behavior within a defined social system (Rogers, 2010). Innovation diffusion has main attributes that influence adoption behavior, namely relative advantage, complexity, compatibility, observability and triability (Al-Jabri *et al.*, 2012).

Hypothesis Development

Social Media Adoption and Use Factor (Twitter)

The technology acceptance model (TAM) 2 work pattern is influenced by several determining factors such as subjective norm variables, image, job relevance, demonstrable results, and output quality which play a role in adapting the technology acceptance model (TAM) 2 pattern. Subjective norms are defined as an individual's understanding of influencing whether to implement a system or not accept a system that is influenced by other people (Venkatesh & Bala, 2008).

Subjective norms according to Ngangi and Santoso (2019) is a social pressure felt by an individual that has an impact on carrying out an action or rejecting it. From previous research (Venkatesh and Bala, 2008; Kavota, Kamdjoug and Wamba, 2020) technology acceptance model (TAM) 2 has the assumption that subjective norms positively influence image. Based on this, this was reinforced by the researchers Wu *et al.* (2011) where social norms have a positive impact on image:

H_1: *Subjective norms have a positive and significant effect on image.*

According to Wu *et al.* (2011) technology acceptance model (TAM) 2 put forward the theory that subjective norms will determine the perception of usefulness. However, in reality, users' views about perceived usefulness may be in constant progress in responding to information that is an invitation to use a technology. According to the opinion of Lin and Chang (2011) the application of the technology acceptance model (TAM) 2 is used as a theoretical basis for knowing the online services provided in an information technology application. Referring to previous research (Wu *et al.*, 2011; Venkatesh & Bala, 2008; Kavota, Kamdjoug and Wamba, 2020) also proves that subjective norms have a positive impact on perceived usefulness.

H_2: *Subjective norms have a positive and significant effect on perceived usefulness.*

Image as an understanding of innovation that is considered to be able to improve a person's status in the social system in society (Moore and Benbasat, 1991). In the technology acceptance model (TAM) 2, image is one of the determinants of perceived usefulness which represents the process of social influence (Venkatesh & Bala, 2008). According to Rogers (1983) image is one aspect of relative advantage.

As is the case in a company with the development of information technology, the company adopts information technology that is relevant to company policy because adopting

this system will affect employee performance and may help make work easier. The company also has the right not to use information technology if the technology is not relevant to the company's objectives. Thus, the technology acceptance model (TAM) 2 assumes that image will have a positive impact on perceived benefits through the internalization and identification stages (Venkatesh & Bala, 2008). it can be found that:

H_3: *Image has a positive and significant effect on perceived usefulness.*

The definition of output quality itself is the extent to which an individual believes that the system is doing its job well. Job relevance and output quality will have a moderating effect on perceived usefulness, so the higher the output quality will be directly proportional to the effect of job relevance on perceived usefulness. (Venkatesh & Bala, 2008).

Spence, Lachlan and Rainear (2016) explains that individuals adopt Twitter or other social media before and after a disaster to share information and see users' reactions. This makes Twitter useful in planning disaster solutions, increasing awareness and health, and being able to measure community participation in disaster management.

These findings were confirmed in research (Venkatesh & Bala, 2008). Technology Acceptance Model (TAM) 2 assumes that output quality has a significant effect on perceived usefulness. The relationship between the two has been investigated by researchers and confirmed (Venkatesh and Bala 2008).

H_4: *Output quality has a positive and significant effect on perceived usefulness.*

Result demostrability are a manifestation of the use of innovation. According to Venkatesh & Bala (2008) explains that effective systems can fail to achieve user acceptance of each other. The reference in assessing technology adoption is the proven results by looking at whether it has real use, can be observed and can be communicated. Results demostrability are important factors in the technology acceptance model (TAM) 2 in designing research hypothesis models. Based on this explanation, a hypothesis can be formulated that:

H_5: *Result demostrability has a positive and significant effect on perceived usefulness.*

Subjective norms in certain products such as information technology have been proven to give rise to intentions to use the product (information technology). According to Irawan and Hurriyati (2021) stated that one thing that can be expanded from TAM (technology acceptance model) is the use of TRA (theory of reasoned action). Important individuals apply the same application and find benefits then subjective norms can increase intention to use (Wu *et al.*, 2011). So with the above statement it can be formulated to have the following hypothesis:

H_6: *Subjective norms have a positive and significant effect on intention to use.*

Perceived ease of use is the extent to which someone believes that by using a particular system they will be free from effort, meaning that with the system the work they do will be easier and faster (Moore and Benbasat, 1991). Another argument adheres to the theory of action identification based on high levels and low levels (Vallacher, Wegner and Somoza, 1989).

In the context of using social media in the form of Twitter, the high level identity can be in the form of high quality information reports and the low level identity can be the use of social media in the form of Twitter with specific features. TAM (Technology Acceptance Model) assume that perceived ease of use influences perceived usefulness (Davis, 1989). So the hypothesis:

H_7: *Perceived ease of use has a positive and significant effect on perceived usefulness.*

Perceived ease of use refers to the extent to which a person believes that using a system will improve their performance in doing work (Davis, 1989). According to Scherer, Siddiq and Tondeur (2019) perceived usefulness is one of two constructs that are of primary relevance in explaining behavioral intentions in accordance with the objectives of the technology acceptance model (TAM).

According to Venkatesh & Bala (2008) using information technology systems will form perceptions about the usefulness of information technology systems. Thus, the perceived usefulness of adopting an information technology system will trigger individual interest in using it so that this will be directly proportional to the intention to use it (Akbari *et al.*, 2020). The technology acceptance model (TAM) assumes that perceived usefulness will influence the intention to use.

H_8: *Perceived usefulness has a positive and significant effect on intention to use.*

Technology acceptance model (TAM) as a direct determinant of perceived usefulness, technology acceptance model (TAM) 2 retains perceived convenience (Davis, 1989). In the last decade, data has been collected that is supported by empirical evidence regarding perceived ease of use which is correlated with intention to impact perceived usefulness directly and indirectly. (Davis, 1989; Venkatesh & Bala, 2008).

Venkatesh & Bala (2008) expressing self-openness to the system, anxiety about the system, ease of the system, and perception of external control (supported conditions) will make the perception of ease of use stronger and provide more experience in using the system. This assumption is strengthened by the existence of a mechanism for perceived ease of use which is felt to develop and form different concepts influenced by social influences which are correlated with the use of social media, thus influencing the intention to use technological adaptation.

H_9: *Perceived ease of use has a positive and significant effect on intention to use.*

According to the opinion of Ajzen (1991) intention to use determines the user's intention to adopt behavior from previous predecessors. Gurtner, Reinhardt and Soyez (2014) in that the intention to use a mobile business application is formed before an individual adopts the application. The higher an individual's intention to use social media applications, the higher the individual's use of social media.

This massive use of Twitter will be used as a reference so that other individuals who have never used Twitter will be interested in using it because the features in the Twitter application make it easy for users to provide and respond to information currently circulating. So it can be assumed that the higher the intention to use, the more often the individual uses Twitter.

H_{10}: *Intention to use has a positive and significant effect on Twitter use.*

Diffusion of Innovation and Social Media (Twitter)

Relative advantage according to Rogers (1983) is one of the characteristics of innovation, so relative advantage is considered a significant determining factor in the use of social media in the form of Twitter (Zolkepli and Kamarulzaman, 2015). Relative advantage has a focus on providing benefits from the adoption of information technology.

According to Simon, Goldberg and Adini (2015) Twitter is one of the platforms as a potential pioneer in providing information in emergency situation management in pre-disaster and post-disaster conditions. Indirectly, Twitter has established a relative advantage for its technological system to be able to compete with other social media platforms. Thus, as an

innovation attribute, relative advantage is positively related to the use or adoption of social media in the form of Twitter. From the explanation above, the following hypothesis can be found:

H_{11}: *Relative advantage has a positive and significant effect on Twitter use.*

Impact of Social Media Use (Twitter)

According to Rogers (1983) the use of information technology (social media) in the form of Twitter must meet the characteristics of innovation, that is information accessibility. The individual effect considered, that is information accessibility, is considered as one of the significant impacts of using Twitter and refers to the benefits of information to instilling information access, information quality and information flexibility (Tajudeen, Jaafar and Ainin, 2018).

Twitter is able to convey the public's concerns, many of whom do not currently understand that social media can help in dealing with disaster crises in terms of access to the information provided, the quality of the information presented, and the timeliness of the information disseminated. Thus, the research hypothesis can be formulated as follows:

H_{12}: *The use of Twitter has a positive and significant effect on information accessibility.*

The influence of the use of social media (Twitter) on psychological conditions and agility is proven by previous research by (Chen, Fay and Wang, 2011; Geldenhuys, Łaba and Venter, 2014). Agility has three dimensions including adaptability, resilience, and proactiveness (Cai *et al.*, 2018).

The use of Twitter will be assessed by how easy and fast it is for users to adapt. The information available on Twitter will influence the actions of its users, whether it only summarizes past information or information that occurs in real time. Judging from the role of information accessibility on Twitter for disaster management, Twitter users really help individuals in the adaptation process due to the changes caused. In this way we can find a hypothesis that:

H_{13}: *The use of Twitter has a positive and significant effect on adaptability.*

Resilience according to Tajudeen, Jaafar and Ainin (2018) is one of the dimensions of agility. Resilience is described as the ability to achieve goals efficiently under the context of a disaster. The use of social media in the form of Twitter and Facebook is used to convey emergency information accurately and up to date (Kim and Hastak, 2018). Resilience is described as the ability to efficiently achieve goals under pressure (Cai *et al.*, 2018).

The relationship between the use of Twitter and resilience can be explained as the use of Twitter as a communication tool in disseminating information on current disasters. The rapid dissemination of information will give the impression that other users are more careful when they are in an area where a disaster is occurring, thereby triggering management. stress caused by disasters. This can reduce the risk of fear and suffering that has been imagined to a minimum. Furthermore, prevention of unnatural disasters can be encouraged in advance. The statement above can lead to the following hypothesis:

H_{14}: *The use of Twitter has positive and significant effect on resilience.*

Environmental changes that occur can be positively influenced by activities carried out proactiveness (Cai *et al.*, 2018). According to Tajudeen, Jaafar and Ainin (2018) proactiveness

is included in the agility dimension. The relationship with the use of Twitter here is whether this media platform can trigger a proactive attitude in disaster management. Proactiveness will be formed if the information available is in accordance with current conditions so that a proactiveness for users can be formed. This proactiveness is vital in mitigation plans when disasters occur. In this context, Twitter as an information service provider can inform the public and coordinate assistance to those in need.

A high increase in the use of social media in the form of Twitter can have an impact in increasing relationships between users, finding solutions to issues that occur, and can reduce costs and time in terms of disaster management.

***H_{15}**: The use of Twitter has a positive and significant effect on proactiveness.*

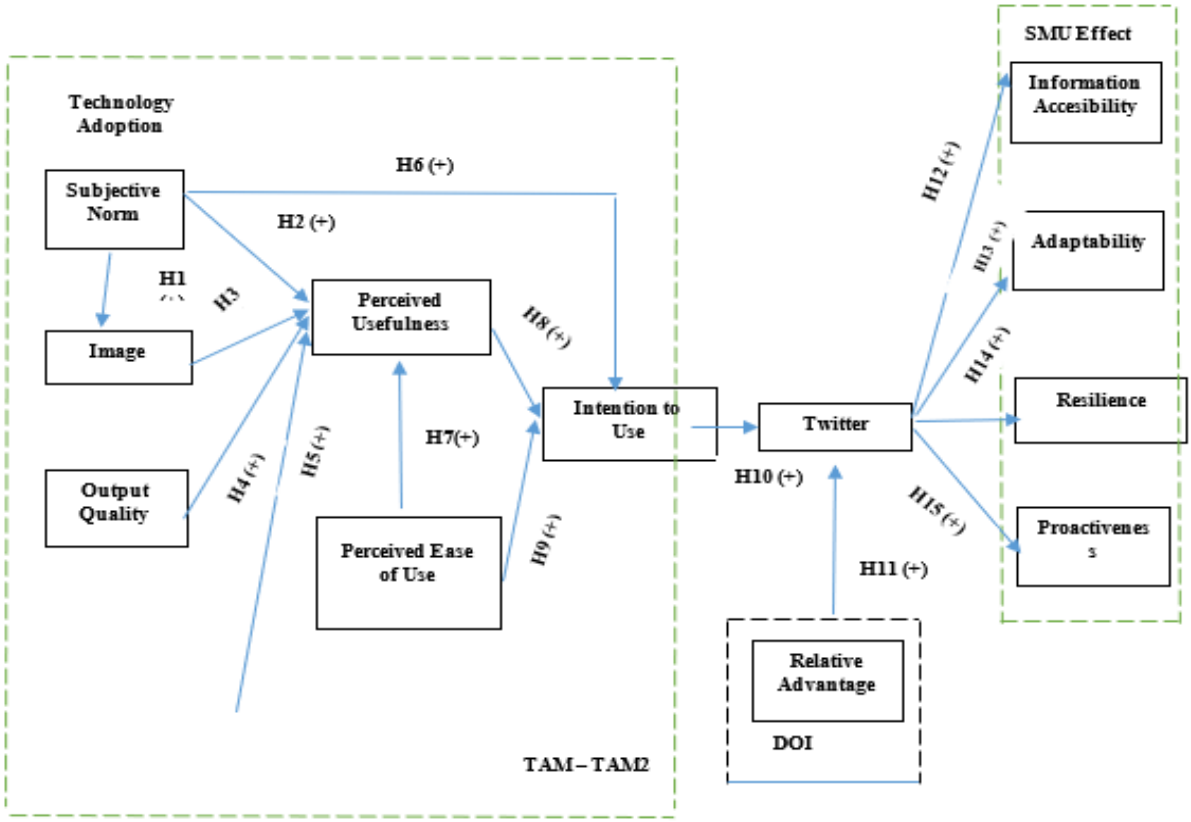

Figure 1. Research Framework

Source: Author (2023)

RESEARCH METHODS

The method implemented in this research uses quantitative methods with primary data collected directly based on the object of study resulting from distributing questionnaires via Google Form, that is Twitter users. The sampling technique was carried out using a non-probability sampling method applying convenience sampling with a sample size of 150 respondents. Furthermore, the variable measuring instrument used in the research uses five likert scales. Meanwhile, the data was analyzed using descriptive analysis and statistical analysis using the structural equation model (SEM) approach by implementing SmartPLS as a data processing tool.

ANALYSIS RESULTS

Measurement Model Testing (Outer Model)

The test results are acceptable because the loading factor and AVE are more than 0,5 in table 1. This shows that all variables have met convergent validity. So, the indicators in the research variables are considered valid.

Table 1. Convergent Validity Test Results

	Loading Factor	AVE
IA1 <- IA	0,878	
IA2 <- IA	0,829	0,594
IA3 <- IA	0,780	
IA4 <- IA	0,754	
I1 <- I	0,971	0,580
I3 <- I	0,738	
RD1 <- RD	0,881	
RD2 <- RD	0,843	0,553
RD3 <- RD	0,760	
R1 <- R	0,879	
R2 <- R	0,752	0,679
R3 <- R	0,753	
A2 <-A	0,847	
A3 <- A	0,798	0,556
A4 <- A	0,841	
A5 <- A	0,755	
PU1 <- PU	0,810	
PU2 <- PU	0,823	0,641
PU3 <- PU	0,832	
PU4 <- PU	0,831	
OQ1 <- OQ	0,887	0,635
OQ3 <- OQ	0,841	
PEOU1 <- PEOU	0,758	
PEOU2 <- PEOU	0,848	0,565
PEOU3 <- PEOU	0,809	
PEOU4 <- PEOU	0,784	
RA1 <- RA	0,797	
RA2 <- RA	0,786	0,551
RA3 <-RA	0,752	
RA4 <- RA	0,822	
IU2 <- IU	0,819	
IU3 <- IU	0,902	0,581
IU4 <- IU	0,838	
SN2 <- SN	0,758	
SN3 <- SN	0,849	0,571
SN4 <- SN	0,852	
P1 <- P	0,865	
P2 <- P	0,851	0,726
P3 <- P	0,840	

	Loading Factor	AVE
T1 <- PT	0,804	
T2 <- PT	0,840	
PT3 <- PT	0,779	0,640
PT4 <- PT	0,760	
PT5 <- PT	0,816	

Source: Primary Data Processed (2023)

Discriminant validity in this construct will be evaluated using additional analytical methods. Evaluation is carried out by comparing the square root value of each average variance extracted (AVE) value. The results in this stage indicate that this research can meet the required discriminant validity criteria. Average variance extracted (AVE) has the root value of each construct being more significant than its correlation. Based on table 2, it can be seen that the AVE value is greater than the correlation between constructs so that it can meet the criteria for discriminant validity.

Table 2. Correlation Results between Latent Variables

	IA	I	RD	R	A	PU	OQ	RA	IU	SN	P	PEOU	T
IA	0,812												
I	0,130	0,863											
RD	0,445	0,047	0,829										
R	0,558	0,098	0,655	0,824									
A	0,646	0,069	0,482	0,598	0,811								
PU	0,640	0,033	0,586	0,667	0,655	0,801							
OQ	0,410	0,046	0,642	0,512	0,585	0,586	0,797						
RA	0,531	0,027	0,745	0,637	0,644	0,661	0,675	0,790					
IU	0,581	0,042	0,524	0,629	0,523	0,644	0,470	0,561	0,864				
SN	0,441	0,126	0,521	0,535	0,530	0,641	0,593	0,567	0,387	0,854			
P	0,240	0,175	0,391	0,355	0,226	0,287	0,227	0,306	0,277	0,221	0,821		
PEOU	0,409	0,092	0,583	0,497	0,426	0,403	0,459	0,481	0,420	0,377	0,382	0,852	
T	0,439	0,237	0,523	0,411	0,477	0,429	0,650	0,474	0,319	0,580	0,381	0,597	0,800

Source: Primary Data Processed (2023)

Furthermore, this research measures the cross loading value of each item. Cross loading is an alternative step to the root of square method in determining discriminant validity.

Table 3. Cross Loading

	IA	I	RD	R	A	PU	OQ	RA	IU	SN	P	PEOU	T
IA1	0,878	0,158	0,432	0,486	0,602	0,593	0,383	0,494	0,482	0,442	0,158	0,409	0,432
IA2	0,829	0,096	0386	0,419	0,508	0,477	0,339	0,418	0,526	0,316	0,203	0,319	0,379
IA3	0,780	0,096	0,249	0,424	0,455	0,458	0,260	0,375	0,377	0,288	0,280	0,287	0,341

	IA	I	RD	R	A	PU	OQ	RA	IU	SN	P	PEOU	T
IA4	0,754	0,038	0,381	0,532	0,545	0,581	0,361	0,450	0,539	0,403	0,132	0,294	0,205
I1	0,142	0,971	0,065	0,128	0,078	0,064	0,085	0,050	0,084	0,145	0,180	0,110	0,262
I3	0,052	0,738	-0,019	-0,020	0,020	-0,066	-0,079	-0,049	-0,091	0,030	0,100	0,010	0,084
RD1	0,359	-0,005	0,881	0,636	0,461	0,516	0,487	0,693	0,445	0,397	0,303	0,455	0,318
RD2	0,380	0,059	0,843	0,481	0,328	0,462	0,551	0,638	0,380	0,474	0,380	0,535	0,545
RD3	0,377	0,078	0,760	0,492	0,395	0,477	0,581	0,510	0,481	0,443	0,302	0,478	0,482
R1	0,520	0,042	0,663	0,511	0,600	0,584	0,879	0,630	0,552	0,560	0,237	0,563	0,658
R2	0,256	-0,002	0,369	0,408	0,494	0,480	0,752	0,498	0,344	0,446	0,131	0,244	0,403
R3	0,117	0,066	0,441	0,272	0,261	0,302	0,753	0,461	0,153	0,387	0,152	0,199	0,438
A2	0,551	0,084	0,386	0,496	0,847	0,524	0,504	0,521	0,417	0,407	0,216	0,407	0,415
A3	0,379	0,063	0,402	0,472	0,798	0,514	0,555	0,557	0,374	0,523	0,136	0,289	0,411
A4	0,625	0,049	0,397	0,519	0,841	0,535	0,403	0,479	0,461	0,352	0,195	0,325	0,357
A5	0,557	0,024	0,377	0,453	0,755	0,559	0,419	0,528	0,452	0,428	0,188	0,361	0,357
PU1	0,365	0,163	0,628	0,810	0,456	0,519	0,491	0,516	0,481	0,486	0,323	0,476	0,413
PU2	0,561	0,083	0,504	0,823	0471	0,539	0,323	0,528	0,593	0,399	0,312	0,463	0,333
PU3	0,463	-0,003	0,527	0,832	0,551	0,553	0,453	0,541	0,562	0,446	0,265	0,396	0,303
PU4	0,459	0,075	0,492	0,831	0,494	0,588	0,413	0,513	0,435	0,427	0,269	0,295	0,298
OQ1	0,571	0,111	0,541	0,584	0,496	0,600	0,405	0,490	0,887	0,322	0,301	0,443	0,309
OQ3	0,422	-0,050	0,352	0,498	0,401	0,509	0,408	0,481	0,841	0,350	0,167	0,271	0,237
PEOU1	0,522	-0,006	0,475	0,551	0,518	0,758	0,453	0,557	0,651	0,393	0,170	0,375	0,231
PEOU2	0,476	0,038	0,483	0,514	0,604	0,848	0,524	0,562	0,473	0,611	0,255	0,343	0,396
PEOU3	0,573	0,004	0,425	0,575	0,540	0,809	0,386	0,461	0,461	0,519	0,250	0,306	0,368
PEOU4	0,480	0,069	0,501	0,498	0,430	0,784	0,516	0,544	0,500	0,513	0,239	0,271	0,368
RA1	0,461	0,064	0,478	0,537	0,524	0,470	0,480	0,797	0,503	0,411	0,202	0,464	0,395
RA2	0,483	-0,049	0,518	0,470	0,509	0,539	0,487	0,786	0,523	0,436	0,097	0,272	0,247
RA3	0,418	-0,014	0,576	0,527	0,613	0,553	0,514	0,752	0,402	0,511	0,214	0,364	0,297
RA4	0,360	0,045	0,734	0,486	0,439	0,546	0,621	0,822	0,385	0,452	0,369	0,381	0,478
IU2	0,276	0,053	0,484	0,470	0,400	0,528	0,525	0,542	0,289	0,819	0,102	0,238	0,437
IU3	0,474	0,138	0,481	0,487	0,562	0,619	0,567	0,475	0,371	0,902	0,232	0,383	0,560
IU4	0,363	0,128	0,365	0,411	0,376	0,483	0,417	0,441	0,325	0,838	0,227	0,334	0,479
SN2	0,095	0,125	0,228	0,185	0,117	0,189	0,144	0,145	0,146	0,181	0,758	0,223	0,241

	IA	I	RD	R	A	PU	OQ	RA	IU	SN	P	PEOU	T
SN3	0,221	0,214	0,401	0,315	0,191	0,268	0,200	0,310	0,280	0,173	0,849	0,289	0,266
SN4	0,249	0,087	0,310	0,348	0,231	0,240	0,207	0,269	0,233	0,195	0,852	0,408	0,418
P1	0,376	0,106	0,451	0,363	0,360	0,366	0,357	0,437	0,308	0,363	0,362	0,865	0,561
P2	0,275	-0,044	0,510	0,429	0,303	0,349	0,395	0,353	0,321	0,322	0,284	0,851	0,426
P3	0,380	0,149	0,537	0,484	0,418	0,314	0,425	0,427	0,444	0,275	0,320	0,840	0,520
T1	0,356	0,273	0,334	0,175	0,347	0,285	0,473	0,323	0,165	0,377	0,279	0,341	0,804
T2	0,388	0,234	0,410	0,308	0,485	0,333	0,573	0,422	0,329	0,535	0,278	0,550	0,840
T3	0,309	0,188	0,427	0,417	0,314	0,310	0,484	0,334	0,273	0,467	0,282	0,519	0,779
T4	0,287	0,143	0,367	0,296	0,299	0,253	0,451	0,275	0,176	0,339	0,305	0,493	0,760
T5	0,399	0,119	0,531	0,420	0,428	0,500	0,591	0,503	0,297	0556	0,378	0,469	0,816

Source: Primary Data Processed (2023)

The required situation states that the value of the targeted latent variable must be greater than the value of the items that have a contribution to the non-target variable. The test results show that each item has a higher value to be targeted than the cross construction. It can be interpreted that the item instrument meets the test criteria for convergent and discriminant validity.

To test the validity of reflective indicators, a relationship is needed between the item values and the construct values used. When other indicators in the same construct change, the measurer applies the indicator that shows the change in the given indicator (excluded from the model). Reflective indicators were felt to be appropriate in measuring perceptions, so reflective indicators were implemented in this research.

When the validity test has been carried out in this research, it will continue in the research model reliability testing stage. Cronbach's alpha and composite reliability are methods for measuring reliability. This research will be confirmatory, so a composite reliability rating in the range of 0,60 to 0,70 is still acceptable. The data presentation contains the calculated Cronbach's alpha value. The purpose of this test is to determine the level of consistency of the measuring instrument, the reliability test implemented. In this research, a reliability test was carried out applying composite techniques and the results of applying SmartPLS.

Table 4. Composite Reliability dan Correlation between Construct

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
IA	0,831	0,862	0.885	0.659
I	0,715	1,320	0.851	0.744
RD	0,773	0,795	0,868	0,688
PU	0,843	0,843	0,894	0,679
A	0,826	0,830	0,885	0,658
PEOU	0,813	0,817	0,877	0,641
R	0,718	0,778	0,838	0,635
RA	0,804	0,837	0,869	0,623
OQ	0,663	0,674	0,855	0,747

	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
IU	0,814	0,827	0,889	0,729
SN	0,761	0,784	0,861	0,673
P	0,813	0,822	0,888	0,726
T	0,860	0,870	0,899	0,640

Source: Primary Data Processed (2023)

The composite reliability in the table above shows a quite satisfactory value, with the variable being at least 0,60. This rating shows that the research variables are still acceptable and show consistency and stability, so it can be stated that the reliability of the instrument has been met.

Structural Model Evaluation (Inner Model)

After going through the stages in discriminant validity and having been validated with the resulting data values, the next step is to test the structural model (inner model). This method is carried out by assessing the internal model which involves checking the relationship between variables by examining path parameter coefficients and significance. The influence of independent factors on the dependent variable can be determined using the coefficient of determination in table 5, which is presented below:

Table 5. Coefficient of Determination

Variable	*R-Square*	*R-Square Adjusted*
IA	0,192	0,187
I	0,031	0,024
PU	0,594	0,580
A	0,228	0,222
R	0,422	0,418
IU	0,432	0,420
P	0,357	0,352
T	0,367	0,359

Source: Primary Data Processed (2023)

The results of the coefficient of determination (R-Square) for the information accessibility variable have a value of 0,192, converted to 19,2% which can be explained by the independent variable while the remaining 80,8% is explained by other variables. The results of the coefficient of determination (R-Square) value for the image variable have a value of 0,031 or 3,1% which can be explained by the independent variable and the remaining 96,9% is explained by other variables. Then the results of the coefficient of determination (R-Square) for the perceived usefulness variable have a value of 0,594 or 59,4% which can be explained by the independent variable and the remaining 40,6% is explained by other variables.

The results of the coefficient of determination (R-Square) for the adaptability variable have a value of 0,228 or 22,8% which can be explained by independent variables and the remaining 77.2% is explained by other variables. Furthermore, the results of the coefficient of determination (R-Square) value for the toughness variable have a value of 0,422 or 42,2% which can be explained by independent variables and the remaining 57,8% can be explained by other variables. The results of the coefficient of determination (R-Square) for the intention

to use variable have a value of 0,432 or 43,2% which can be explained by the independent variable and the remaining 56,8% is explained by other variables.

The results of the coefficient of determination (R-Square) value for the proactive variable have a value of 0,357 or 35,7% which can be explained by the independent variable and the remaining 64,3% is explained by other variables. Finally, the coefficient of determination (R-Square) value for the usage variable has a value of 0,367 or 36,7% which can be explained by the independent variable and the remaining 63,3% is explained by other variables.

Hypothesis Test

Hypothesis testing in this research was assisted by the implementation of the SmartPLS software in testing the relevance of loading factors and coefficients applying the boostrapping technique to double the research sample size. The initial sample size of 150 will be converted to 300 so that the data will double from the original data.

The bootstrapping method has standard rules for its assessment, with the p-value having a value of less than 0,05 and the t-statistics value must be more than 1,96 (Sarstedt, Ringle, and Hair, 2017). The results of research hypothesis testing can be reviewed in the table below:

Table 6. Hypothesis Testing

Hypothesis	Original Sample (O)	T Statistics (|O/STDEV|)	P-Value	Conclusion
Image -> Perceived Usefulness	0,051	0,938	0,348	H1 Rejected
Result Demonstrability -> Perceived Usefulness	0,323	2,669	0,008	H2 Supported
Perceived Usefulness -> Intention of Use	0,193	1,584	0,113	H3 Rejected
Perceived Ease of Use -> Perceived Usefulness	0,297	2,676	0,007	H4 Supported
Perceived Ease of Use -> Intetion to Use	0,511	5,993	0,000	H5 Supported
Relative Advantage -> Twitter Use	0,215	1,325	0,185	H6 Rejected
Output Quality -> Perceived Usefulness	0,247	2,169	0,030	H7 Supported
Intention to Use -> Twitter Use	0,458	2,751	0,006	H8 Supported
Subjective Norm -> Image	0,175	1,748	0,081	H9 Rejected
Subjective Norm -> Perceived Usefulness	0,066	1,347	0,178	H10 Rejected
Subjective Norm -> Intention to Use	0,006	0,079	0,937	H11 Rejected
Twitter Use -> Information Accesibility	0,439	5,583	0,000	H12 Supported
Twitter Use -> Adaptability	0,477	6,830	0,000	H13 Supported
Twitter Use -> Resilience	0,650	15,074	0,000	H14 Supported
Twitter Use -> Proactiveness	0,597	10,833	0,000	H15 Supported

Source: Primary Data Processed (2023)

Discussion

The Effect of Image on Perceived Usefulness

The image variable has a positive but not significant influence on perceived usefulness. The cause of the insignificance is that when testing the hypothesis it was found that there was no escalation of the value of the perceived usefulness in image units which could not increase the value of the variable. This is because the image of social media does not support the perceived usefulness because users do not really think about the image of social media (Twitter) so they focus more on the information content in the application.

The image of the Twitter platform is not very relevant to its perceived usefulness. Perceived usefulness itself is the impact of using an information technology system. When Twitter users have an individual view of the use of a system which is quite easy and comfortable, the image factor does not have much of an impact on the user, this means that the image does not have a significant effect on perceived usefulness. The findings in this study are different from previous research (Damayanti, 2019; Kavota, Kamdjoug and Wamba, 2020) which states that the image variable has a positive and insignificant influence on perceived usefulness.

The Effect of Result Demonstrability on Perceived Usefulness

Outcome variables that can be demonstrated have a positive and significant effect on perceived usefulness. The perceived usefulness needs to be supported by results that can be demonstrated because the social media platform (Twitter) when the application is deemed useful for handling the dissemination of information on disasters that occur, then the results of the information are worthy of follow-up.

The social media platform (Twitter) is believed to have results that can be demonstrated to users because the information processed can be done in real time so that if preventive action is to be taken against a disaster it can be done as soon as possible. These findings support previous research Kavota, Kamdjoug and Wamba (2020) which shows that results demonstrability have a positive and significant influence on perceived usefulness.

The Effect of Perceived Usefulness on Intention to Use

The perceived usefulness variable has a positive but not significant effect on intention to use. Perceived usefulness at a high level will not increase interest in using Twitter to access disaster information. Another suspicion is that Twitter users are still generalizing all information and have not focused on finding disaster information that can facilitate disaster management quickly. This finding is different from previous research Kavota, Kamdjoug and Wamba (2020) shows that perceived usefulness has a positive and significant impact on intention to use.

The Effect of Perceived Ease of Use on Perceived Usefulness

The perceived ease of use variable has a significant effect on perceived usefulness. The use of the Twitter platform in the application of information technology will measure the impact of ease of use and usability. Both are important factors in implementing information technology systems. As previously explained in the theory of action identification based on high levels and low levels (Vallacher, Wegner and Somoza, 1989). In the context of using social media in the form of Twitter, the high level identity can be in the form of high quality information reports and the low level identity can be the use of social media in the form of Twitter with specific features.

Perceived ease of use is related to the assessment of information technology characteristics such as ease of use, ease of adaptation, flexibility and clarity of information (Gefen and Straub, 2000). When a user directly applies an information technology system, it will add to the experience, thus the user will understand whether the system is easy to use or difficult to use. These findings have similarities with previous research (Kavota, Kamdjoug and Wamba, 2020) that stating the perceived ease of use variable has a positive and significant influence on perceived usefulness, is supported by other research by (Wamba *et al.*, 2017).

The Effect of Perceived Usefulness on Intention to Use

The perceived ease of use variable has a positive and significant effect on intention to use. Perceived ease of use and perceived usefulness are important factors in information technology adoption. According to Ajzen (1991) motivational factors that influence behavior, this is defined as the extent to which an individual is willing to try a technological system.

The higher the intention to use, the greater the possibility of ease of use of information technology. The requirement for using Twitter in managing information about disasters is the level of behavioral intention to use the application so that when the intention to use is low there will be problems when using Twitter. When the information presented on Twitter is clear and easy to understand, it will increase the user's behavioral intention to use Twitter. This finding is in accordance with previous research (Kavota, Kamdjoug and Wamba, 2020) which states that the perceived ease of use variable has a positive and significant effect on intention to use.

The Effect of Relative Advantage on Twitter Use

The relative advantage variable has a positive but not significant effect on Twitter use. Relative advantage focuses on the expected benefits from using a particular technology (Rogers, 1983). Relative profit percentages can be measured in economic terms, social prestige factors, convenience, and satisfaction (Rogers, 1983). The development of information technology that occurs using or adopting the use of Twitter is not an advantage because users have easily adapted to using Twitter. Twitter has a hashtag and trending topic feature, which is a relative advantage of this platform.

According to Rogers (1983) The level of relative advantage can be expressed in terms of economic profitability, social pride, or other advantages, in this case Twitter does not have an impact on economic profitability because it is used as a tool for exchanging information and the value of social prestige is not a benchmark for its users. The findings in this research are different from previous research like Kavota, Kamdjoug and Wamba (2020) which states that relative advantage has a positive and significant effect on the use of social media.

The Effect of Output Quality on Perceived Usefulness

The output quality variable has a positive and significant effect on perceived usefulness. The diversity of information available makes it easy for users to find all the information that is currently happening. The unstoppable development of information allows users to choose between correct information and wrong information. The quality of the output in question is the result of information contained in the use of social media (Twitter). Webber, Sarris and Bessell (2010) also revealed that there are several ways to assess the validity of information including authenticity, accuracy, completeness, uniqueness, timeliness, relevance, precision, conciseness, informativeness.

Mukkamala and Beck (2018) dissemination of real time situation information even in a crisis situation. The more precise the decisions taken, the better the quality of the information

will be, this is in accordance with actions in dealing with the disaster that is occurring. The findings of this research are in accordance with previous research like Kavota, Kamdjoug and Wamba (2020) which states that the output quality variable has a positive and significant effect on perceived usefulness.

The Effect of Intention to Use on Twitter Use

The intention to use variable has a positive and significant effect on Twitter use. There is no difference in the results of changing the general use of social media to the more specific use of Twitter. The higher the intention to use, the greater the possibility of actual use of information technology (Gurtner, Reinhardt and Soyez, 2014). Twitter as a social application has this when users focus on investigating, collecting and disseminating information.

The information on Twitter can be filtered to whatever is actual and can be implemented in overcoming crises and disasters that occur, such as floods in an area, volcanic eruptions in Sumatra several months ago. With Twitter, users will know and will take preventive action. so that casualties can be minimized. These findings are in accordance with previous research like (Kavota, Kamdjoug and Wamba, 2020). The intention to use variable has a positive and significant effect on Twitter use.

The Effect of Subjective Norm on Image

The subjective norm variable has a positive but not significant effect on image. Image is considered the use of innovation in increasing status within social strata (Moore and Benbasat, 1991). Individual behavior influences whether to accept or reject a system related to the image of the social media platform. Image understanding will be considered important or not based on individual behavior.

These results show that Twitter already has strong branding with all the information contained in it indirectly because user behavior is not directly influenced by the environment so Twitter can attract sympathy with information and ease of use of the application. This finding is different from previous research like Kavota, Kamdjoug and Wamba (2020) which states that subjective norms have a positive and significant effect on image.

The Effect of Subjective Norm on Perceived Usefulness

The subjective norm variable has a positive but not significant effect on perceived usefulness. The use of Twitter is the right of each individual so that not everyone interprets it as personal gain and privacy. In the case of disaster handling other individuals do not care about other users' opinions about handling disasters or not. Twitter users do not often respond to normative influences in the application, but another interesting thing is that the presentation of information on Twitter is easier to understand and more concise, so that Twitter is considered able to handle actions related to disasters such as natural disaster donation assistance, sustainable information dissemination, and easy access to information so that existing features enable disaster management to be faster and more flexible. The findings are in accordance with previous research like Kavota, Kamdjoug and Wamba (2020) which stated that subjective norms had a positive and but not significant effect on perceived usefulness.

The Effect of Subjective Norm on Intention to Use

The subjective norm variable has a positive but not significant effect on intention to use. Results of research carried out (Kavota, Kamdjoug and Wamba, 2020) has similarities with the

results of this study. This research stated that subjective norms did not have a positive and but not significant effect on intention to use.

Furthermore, this statement is not in accordance with the TAM 2 postulate by Venkatesh & Bala (2008) which states that subjective norms have an influence on intention to use. The main reason is that subjective norms are not a determining factor in the intention to use information technology, especially the use of Twitter. As technology develops, subjective norms do not need to be considered, which are replaced by application advertisements that are easy to find and easy to find social media so that the individual factors themselves can stimulate the use of Twitter and its benefits can work together.

The Effect of Twitter Use on Information Accessibility

The Twitter usage variable has a positive effect on information accessibility. Information accessibility is one of the impacts of using social media (Tajudeen, Jaafar and Ainin, 2018). Furthermore, people who are experiencing a disaster or are involved use Twitter to disseminate or obtain information in real time.

Other studies have contributed by highlighting that for information to be accessible, how the data is constructed must be easy to find (Goodhue and Thompson, 1995), shared (Davenport, 1993), can be interpreted (Strong, Lee and Wang, 1997), understood (Strong, Lee and Wang, 1997), and delivered through technology that is easy to use (Wang, 1996). Ease of access to information will have a further effect on rescue operations and trigger awareness for users. Another function of Twitter in disaster management is that users' agility and speed in using the application causes other users to adapt quickly to developing issues. This finding is in accordance with previous research like Kavota, Kamdjoug and Wamba (2020) which stated that the use of social media has a positive and significant effect on information accessibility.

The Effect of Twitter Use on Adaptability

The Twitter usage variable has a positive effect on adaptability. The ability to adapt triggers social media users to learn about new tasks and responsibilities in relation to this research. Social media users have a role in disseminating valid information and its validity can be accounted for so that when the information they have is appropriate it will trigger a preventive attitude in responding to problems that occur. The implementation of social media in the context of disaster management allows each individual to change their life behavior caused by the disaster that occurred (Mukkamala and Beck, 2018).

Successful adaptation to certain situations will also reduce the risk of stress caused by disasters. For example, in Indonesia during the corona virus outbreak, the government has made an appeal to educate the public through all social media platforms on how to deal with the crisis. Furthermore, predictions of a global economic crisis trigger the government to take certain actions to deal with the food crisis so that the role of social media is very helpful for all groups to know current global developments. The findings in this research are in accordance with previous research like Kavota, Kamdjoug and Wamba (2020) which stated that the use of social media has a positive and significant effect on adaptability. The findings in this research are in accordance with previous research which states that the use of social media has a positive and significant effect on proactivity.

The Effect of Twitter Use on Resilience

The Twitter use variable has a positive and significant effect on resilience. Dimensions of agility categorized by Cai *et al.* (2018) includes adaptability, resilience, and proactive attitude.

Resilience focuses on having a positive attitude regarding change, new ideas, and technology. Resilience is also considered flexible because it triggers an attitude of tolerance and can face unpredictable or unpredictable situations. Resilience is also expected in the form of overcoming or dealing with stress that occurs.

For example, in the case of the earthquake that occurred in Yogyakarta (Wardiono, Dimyati and Absori, 2021) causing this complex loss, it is explained that the death toll was 4,674 people and 150 buildings were heavily, moderately and lightly damaged. The use of social media, especially Twitter, can bridge information that is currently happening because in 2010 the development of information technology was not as massive as it is now, so the handling was considered slow. The use of Twitter also provides agility in restructuring things damaged by disasters, faster preventive action in handling crises. The findings in this study are in accordance with previous research by Kavota, Kamdjoug and Wamba (2020) which stated that the use of social media has a positive and significant effect on resilience.

The Effect of Twitter Use on Proactiveness

The variable Twitter use has a positive and significant effect on proactiveness. Proactivity refers to employee initiative in carrying out activities that positively influence environmental change (Alavi *et al.*, 2014; Huang and Cai, 2015; Cai *et al.*, 2018). A proactive attitude involves anticipating problems related to change, which in this research involves the adoption of social media by anticipating disasters with changes in the media for disseminating information to social media users, especially Twitter, which is considered faster to coordinate quickly according to the current situation.

According to Cai *et al.* (2018) the impact of proactiveness forms an individual's indication of being moved to take the initiative to take action for improvement. For example, in the case of the crisis experienced by Palestine, all Muslims carried out a social movement to support a ceasefire, especially in Indonesia, which has a large Muslim majority population, so the role of social media is really needed to take a proactive stance. A concrete example is the group prayer held at Monas utilizing the massive role of social media to form a mass call for action to defend Palestine. Then the role of social media, especially Twitter, can help in fundraising actions. Using Twitter can lead to an effective approach in dealing with disasters and finding the best solutions. Therefore, proactivity is important in disaster mitigation plans.

CONCLUSIONS

This study reveals major implications for research. This research presents a model for determining the factors behind Twitter use in the context of disaster management and the impact of Twitter. First, this research was carried out by comparing theories in explaining the adoption and use of social media (Twitter) in disaster management and identifying the impacts that occur. This research has an added point in explaining the impact of Twitter use but also the factors of acceptance and use of Twitter.

The results obtained in the research have proven the validity of TAM to explain the acceptance and use of Twitter in Indonesia, which often experiences disasters. This research will help the behavior of using Twitter on how to deal with disasters as well as the use of social media which will really help the government and disaster management teams in taking action. Combination of the technology acceptance model with the diffusion of innovation theory in understanding the actual use of Twitter in disaster situations.

Second, the findings in the research explain that the use of Twitter in disaster management can increase information accessibility, adaptability, proactive attitude and resilience. Accessibility of information is the main component in using Twitter so that the

benefits of using Twitter for disaster management are for cases that occur in several regions in Indonesia, so that it can be applied to other countries experiencing disaster crises.

The practical implications in this study show that the adoption and impact of Twitter in managing disasters in Indonesia as a whole. This research provides a good understanding of how information technology, especially Twitter, can be connected to social life when experiencing a disaster crisis. Technological progress in Indonesia is in line with its use so that the use of technology because internet access has sufficient infrastructure will make it easier for society to respond to a disaster crisis that occurs.

The driving factor for Twitter as a tool in disaster management is when information technology is easy to use, increasing the perception of the usefulness of the technology system. When all the main factors are taken into account, the flow of information in disaster management will become increasingly massive, so that the publication of information will have a big impact on pre-disaster and post-disaster actions. With the ease of use, Twitter will back up disaster information so that old or new types of data can be searched online. Disaster management involving Twitter as the main tool is deemed appropriate with the features it has so that the adoption and use of Twitter leads to increased information accessibility, adaptability, resilience and proactive attitude. Determinants of adoption must have an impact on all levels, not only society but also the government, so that the integration carried out influences the response to a disaster crisis.

The limitation in this research is that the sample collection carried out did not include all Twitter users in Indonesia who responded due to limited respondents. This research only analyzes the technological construct where there are still other construct factors such as the environment and organizations that directly handle disasters. Future research is expected to expand the research construct so that further research can cover the shortcomings of this research. Data used in the research This is limited to using a Google form with a questionnaire method which is deemed not specific enough to assess the use of Twitter for disaster management. Suggestions for further research include developing interviews using Twitter for disaster management.

For future research, it is hoped that the findings in this research will be updated by applying other methods such as using qualitative methods to help academics and the government in handling crisis situations. In conclusion, there are many studies that carry out comparisons regarding the application of information technology, especially Twitter, in understanding the context of the disaster management cycle and steps to analyze useful disaster data. It is possible that the use of Twitter can bridge the process of managing disasters that occur naturally or artificially.

To understand more deeply how Twitter is used and its impact in regions facing the same crisis situation as that which occurred in Indonesia, the theory in this research has empirically validated the research model based on TAM, diffusion of innovation theory, framework, use of Twitter, and theory. technology adoption. The findings show that the Twitter platform is considered easy to use, has good output quality, improves its image in society, relations with the faculties.

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