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Implementation of a centralized health quarantine information system at the Pangkalpinang Port Health Office

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Abstract

Purpose: This research aims to evaluate and analyze the factors affecting the implementation the health quarantine information system (SINKARKES) in KKP Pangkalpinang. **Methods:** Quantitative research with cross-sectional design research. The population studied several 65 respondents. Test statistical and data analysis using structural equation model Partial least-square with smartpls 3.0 software. **Results:** Five factors have significant effects in supporting the success of the implementation of SINKARKES, the quality of the system to the user satisfaction, the quality of information on user satisfaction, the quality of service to user satisfaction, the use of systems against net benefit and management support of net benefit. **Conclusions:** The implementation of SINKARKES uses a top-down approach with the development and adjustment of a system that runs thoroughly by focusing on meeting the needs of the central unit. This approach model is considered not ideal for the characteristics of the complex health quarantine information system module.

Keywords: evaluation; health quarantine information system; HOT-FIT; SEM PLS

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INTRODUCTION

Technological advances in transportation and free trade will raise the risk of health problems, new diseases, and old diseases that re-emerge with faster spread, thus creating the potential for public health emergencies. Therefore, comprehensive and coordinated disease prevention and control efforts, health risk factors, resources, community participation, and international cooperation are required [1]. The increasing mobility of people globally drives the risk of infectious disease transmission to new locations. In recent years, there have been incidents of infectious disease transmission that have crossed geographical boundaries and have never happened before, as shown by the spread of the Zika virus in the United States [2] and the spread of the Middle East respiratory syndrome coronavirus (Mers-CoV) originating from Saudi Arabia and spreading to Asian countries such as South Korea, Singapore, and Indonesia [3].

Health institutions need to be aware of global outbreaks and emerging threats by anticipating them and providing information systems to be used as reference materials to initiate a rapid and coordinated response. In response to this, the implementation of an information and communication system in the implementation of a health information system is the best solution for supporting health quarantine services. [4]. The role of the health information system is to make, analyze, and disseminate this data promptly so that public health service efforts can be carried out effectively and efficiently [5].

The port health office has the task of preventing the entry and exit of diseases into the territory of the Republic of Indonesia. Concerning the main task, the Ministry of Health has built an information system that manifests automation in quarantine services, which has been implemented through the health quarantine information system (SINKARKES: *Sistem Informasi Karantina Kesehatan*). The implementation aims to support the main tasks and functions of the agency and support the planning and decision-making process at various managerial levels related to the field of health quarantine. The Health Quarantine Information System at the Pangkalpinang Port Health Office has been implemented since 2016 and, until now, has functioned as the central quarantine service system in the form of international vaccination services, issuance of transportation certificates at the port, and issuance of flight certificates in the airport area.

The results of observations and preliminary studies still show shortcomings in the implementation of SINKARKES at the Pangkalpinang Port Health Office. The availability of features to accommodate the use of SINKARKES is still not appropriate with the needs model and classification of tasks of the Pangkalpinang port health office, such as online registration on the international vaccination module to serve the community who want to get vaccination services, not been fully utilized by users so that there is still a lot of data found incomplete or empty. Manual input of certificate issuance data still has to be done even though there is an automation feature that accommodates the needs of health document issuance because the SINKARKES runtime still experiences periodic downtime. In addition, the availability of reports in various modules is still unable to be utilized optimally for planning policies, online data management, procurement, and logistics stock requests for the central unit.

Based on the problems found from the initial observation results, an evaluation of the implementation of SINKARKES in the work area of the Pangkalpinang Port Health Office is needed to assess the factors that influence the implementation of SINKARKES in supporting the needs of the port health office to carry out its main tasks and functions. The implementation of a system is said to be running well, not only seen from the perspective that the system can receive and manage input and produce good information output but also from users ' willingness to use the system so that they can improve the performance of each or all individuals in achieving organizational goals [6].

The evaluation model used is the Human Organization Technology (HOT) Fit Model, which assesses the components of important factors in a single unitary model consisting of the variable components Human, Organization, Technology, and the suitability of the relationship between these variables to produce Net Benefit from the implementation of the Health Quarantine Information System [7]. The evaluation aims to determine the description of the assessment of the implementation of the health quarantine information system used at the Pangkalpinang Port Health Office and whether its users utilize it properly. Therefore, the researcher conducted a study to evaluate the implementation of SINKARKES at the Pangkalpinang Port Health Office.

METHODS

This research is quantitative and uses a questionnaire approach. The data type used in this study is primary data derived from questionnaire questions adapted from research [8,9]. The research questionnaire uses a Likert scale with five statement values. It consists of 46 questions to measure system quality, information quality, service quality, system usage, user satisfaction, management support, vendor support, IT capabilities, and net benefits.

The population in this study was all employees of the Pangkalpinang Port Health Office who use the Health Quarantine Information System in their work. The population in this study was 65 respondents. The data analysis technique used in this study is the Structural Equation Model Partial Least Square (SEM-PLS) to complete multiple regression. PLS analysis has two stages: outer model and inner model evaluation. The outer model is a measurement model used to assess the validity and reliability of the model by going through an algorithm iteration process so that the parameters of the measurement model (convergent validity and composite reliability) are obtained.

In contrast, the inner model is a structural model that estimates the causal relationship between latent variables through bootstrapping and t-statistic test parameters. Thus, it can predict a causal relationship [10]. The analysis was carried out using smartPLS software version 3.0. PLS can analyze the relationship between variables and structural model specification errors in research variables [11].

RESULTS

A total of 65 questionnaires were distributed to respondents at the Pangkalpinang Port Health Office. The final result was obtained, and the questionnaire was returned with complete answers. Table 1 below shows the characteristics of respondents in this study.

Research site overview

Pangkalpinang Port Health Office is a technical implementation unit (UPT) within the Ministry of Health, which is under and responsible for the Director General of Disease Prevention and Control of the Ministry of Health of the Republic of Indonesia. In the Regulation of the Minister of Health of the Republic of Indonesia No: 356/MENKES/PER/IV/2008 Jo Permenkes Number 2348/MENKES/PER/XI/2011 concerning the Organization and Implementation of the Port Health Office, it is stated that the Pangkalpinang port health office consists of the General Administration Sub-Section, the Health Quarantine Control and Epidemiology Surveillance Section (PKSE) and the Cross-Regional Environmental and Health Risk Control Section (PRLKLW), along with work areas and installations spread across the Bangka Belitung Province.

Table 1. Respondent characteristics (n=65)

Characteristics		n	%
Gender	Man	38	58.46
	Woman	27	41.54
Education	Strata 2	3	4.62
	Bachelor degree	27	41.54
	Diploma III	23	35.38
	High School/Vocational School	12	18.46
Work Location	Head Office	33	52.94
	Total	65	100
	Pel. S Selan	2	3.08
	Belinyu Pel	2	3.08
	Muntok Pel	5	7.69
	Dear Mr. Amir	7	10.77
	Tanjung Pandan Beach	11	16.92
	Manggar Pel	5	7.69
Years of service	< 1	5	7.69
	1-5	21	32.31
	6-10	12	18.46
	> 10	27	41.54
Age (years)	<25	6	9.23
	25-30	15	23.08
	31-45	32	49.23
	>45	12	18.46
Duration of use (years)	<1	9	13.85
	1-3	14	21.54
	>3	42	64.62

The port health office has the primary task and function of preventing the entry and exit of infectious diseases, potential epidemic diseases, security against new diseases and re-emerging diseases, epidemiological surveillance, quarantine, health services, control of environmental health impacts, bioterrorism, biological elements—chemicals and radiation security in the working area of airports, ports, and land border crossings. The working area of the port health office in Pangkalpinang consists of the Main port health office at Pangkalbalam Sea Port and six working areas spread across Bangka Island and Belitung Island.

Overview of Health Quarantine Information System

The health quarantine information system (SIMKESPEL: *Sistem Informasi Kesehatan Pelabuhan*) is a web-based information system developed by the Directorate of Health Quarantine, Directorate General of Disease Prevention and Control, Ministry of Health of the Republic of Indonesia to accommodate the service needs in the port health office work unit areas throughout Indonesia. The system has undergone several changes, adjusting to the conditions and needs of work units in the field. It was developed and first released in 2016. *Sistem Informasi Karantina Kesehatan* (SINKARKES) (Figure 1) has several submenus, including the International vaccination menu, Ship service menu, Health quarantine service menu, Aircraft service menu, Health effort menu, Environmental risk control menu, and National recapitulation menu. In addition, a dashboard displays national data on the occurrence of KKM-MD, the number of infectious and non-infectious diseases, and the number of passenger health statuses on arrival and departure of transportation. The dashboard can be selected based on the available modules and port health office locations.

Figure 1. SINKARKES service module

Evaluation of measurement model (*outer* model)

The measurement model is evaluated by measuring the correlation between indicators and constructs or variables. The correlation value obtained between indicators and constructs measures the validity and reliability of the model used. The measurement model evaluation consists of testing convergent validity, discriminant validity, composite reliability, and Average Variance Extracted (AVE).

Convergent validity

Convergent Validity in the SEM PLS test is a type of validity that requires a construct to have a high correlation so that it can be used to measure the magnitude of the correlation between latent variables and manifest variables. The assessment of convergent validity evaluation is seen from the correlation between component values (item score/component score) and construct values based on loading factors [12]. Convergent validity is determined to meet the validity requirements if it has a loading value> 0.7 [13]. The results of the loading factor test in this study were carried out up to three stages of testing because there were loading values that still did not meet the requirements in the first and second tests. The results of the third stage of testing that have met the requirements for loading factor values> 0.7 can be seen in the picture and diagram below.

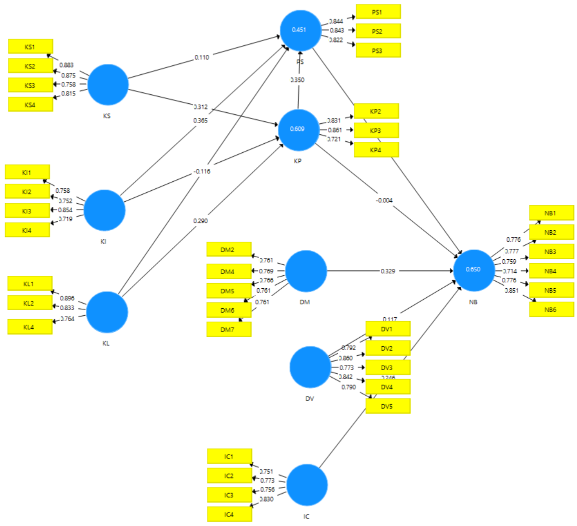

Figure 2. Results of the outer loading diagram test

Table 2. Loading factor test results

	DM	DV	IC	KI	KL	KP	KS	NB_	PS
DM2	0.761								
DM4	0.769								
DM5	0.766								
DM6	0.761								
DM7	0.761								
DV1		0.792							
DV2		0.860							
DV3		0.773							
DV4		0.842							
DV5		0.790							
IC1			0.751						
IC2			0.773						
IC3			0.756						
IC4			0.830						
KI1				0.758					
KI2				0.752					
KI3				0.854					
KI4				0.619					
KL1					0.896				
KL2					0.833				
KL4					0.764				
KP2						0.831			
KP3						0.861			
KP4						0.721			
KS1							0.883		
KS2							0.875		
KS3							0.758		
KS4							0.815		
NB1								0.776	
NB2								0.777	
NB3								0.759	
NB4								0.714	
NB5								0.776	
NB6								0.851	
PS1									0.844
PS2									0.843
PS3									0.822

Based on the results of the Loading Factor Stage 3 test shown in Figure 2 and Table 2, all the values of the construct indicator loading factors are > 0.7, so they have met the requirements for convergent validity. The next test stage is to calculate the Average Variance Extracted value, as shown in the test results in Table 3. Table 3 shows that the AVE value produced by all constructs is > 0.5, so all indicators have met the convergent validity requirements.

Table 3. Average variance extracted value

Variabel	AVE
DM	0.555
DV	0.630
IC	0.570
KI	0.563
KL	0.646
KP	0.651
KS	0.696
NB	0.555
PS	0.700

Discriminant validity

Discriminant validity is a measurement model (outer model) based on the principle that different constructs cannot be allowed a higher correlation value than the construct's vat, which is its variable. Therefore, discriminant validity can be measured based on the cross-loading value of the manifest variable (indicator) to each latent variable. The results of the cross-loading value calculation can be seen in Table 4. In Table 4, the correlation value between the latent variable and its indicator is more significant than that of the other variables. Therefore, the latent variable can better predict its indicator than other latent variables.

Table 4. Cross-loading test results

	DM	DV	IC	KI	KL	KP	KS	NB_	PS
DM2	0.661	-0.049	-0.04	0.189	-0.048	0.163	0.219	0.374	0.396
DM4	0.769	0.305	0.19	0.357	0.313	0.269	0.250	0.393	0.293
DM5	0.766	0.238	0.21	0.384	0.208	0.312	0.219	0.454	0.241
DM6	0.761	0.375	0.371	0.36	0.336	0.359	0.366	0.502	0.409
DM7	0.761	0.196	0.394	0.505	0.355	0.433	0.517	0.606	0.552
DV1	0.283	0.792	0.194	0.190	0.545	0.475	0.361	0.332	0.288
DV2	0.158	0.86	0.366	0.255	0.600	0.444	0.349	0.396	0.246
DV3	0.085	0.773	0.187	0.198	0.517	0.230	0.219	0.175	0.114
DV4	0.344	0.842	0.253	0.394	0.553	0.340	0.304	0.367	0.221
DV5	0.284	0.69	0.312	0.240	0.518	0.376	0.240	0.167	0.091
IC1	0.358	0.199	0.751	0.322	0.379	0.605	0.334	0.393	0.254
IC2	0.313	0.318	0.773	0.601	0.513	0.652	0.539	0.458	0.317
IC3	0.218	0.229	0.656	0.296	0.264	0.433	0.322	0.336	0.313
IC4	0.128	0.251	0.83	0.450	0.345	0.645	0.413	0.453	0.355
KI1	0.393	0.154	0.381	0.758	0.343	0.457	0.527	0.585	0.511
KI2	0.281	0.291	0.334	0.752	0.402	0.380	0.477	0.382	0.472
KI3	0.320	0.293	0.593	0.854	0.442	0.699	0.592	0.568	0.473
KI4	0.553	0.257	0.342	0.619	0.269	0.413	0.355	0.563	0.390
KL1	0.405	0.655	0.419	0.419	0.896	0.575	0.513	0.483	0.361
KL2	0.270	0.574	0.438	0.295	0.833	0.454	0.476	0.423	0.231
KL4	0.090	0.399	0.362	0.468	0.664	0.456	0.360	0.233	0.209
KP2	0.101	0.302	0.649	0.615	0.497	0.831	0.584	0.463	0.519
KP3	0.489	0.564	0.651	0.559	0.580	0.861	0.581	0.611	0.600
KP4	0.486	0.252	0.599	0.424	0.410	0.721	0.494	0.378	0.261
KS1	0.463	0.196	0.572	0.635	0.412	0.636	0.883	0.530	0.436
KS2	0.407	0.361	0.409	0.611	0.459	0.583	0.875	0.511	0.511
KS3	0.477	0.339	0.364	0.484	0.423	0.433	0.758	0.612	0.467
KS4	0.145	0.404	0.447	0.457	0.600	0.626	0.815	0.368	0.340
NB1	0.611	0.316	0.396	0.458	0.404	0.394	0.417	0.676	0.448
NB2	0.337	0.197	0.274	0.517	0.245	0.408	0.424	0.677	0.443
NB3	0.354	0.241	0.397	0.579	0.332	0.398	0.442	0.759	0.594
NB4	0.344	0.456	0.228	0.49	0.395	0.421	0.367	0.714	0.538
NB5	0.669	0.288	0.587	0.590	0.361	0.568	0.517	0.776	0.488
NB6	0.472	0.272	0.479	0.490	0.400	0.521	0.496	0.851	0.544
PS1	0.559	0.204	0.383	0.596	0.361	0.441	0.492	0.697	0.844
PS2	0.341	0.206	0.324	0.550	0.257	0.588	0.478	0.519	0.843
PS3	0.397	0.270	0.315	0.356	0.222	0.470	0.319	0.465	0.822

Composite reliability

In the SEM-PLS model, the composite reliability test is one of the evaluations in the measurement model (outer model). Latent variables can be considered reliable if their composite reliability value is > 0.7 and their Cronbach's Alpha value is > 0.7 [14]. The composite reliability and Cronbach's alpha values are shown in Table 5. The Cronbach's Alpha value and the Composite Reliability value produced by all constructs are > 0.70, so based on the suitable results above, it can be concluded that all construct indicators are reliable and meet the reliability test requirements.

Table 5. Cross-loading test results

	Cronbach's Alpha	Composite Reliability
DM	0.801	0.861
DV	0.859	0.894
IC	0.747	0.841
KI	0.736	0.836
KL	0.717	0.843
KP	0.735	0.848
KS	0.853	0.901
NB	0.839	0.881
PS	0.788	0.875

Structural model evaluation (*inner model*)

The structural or inner model is evaluated to see the relationship between constructs or variables. The structural model begins with the R-squared test and the path coefficient test. The structural model assessment stage in SEM-PLS is carried out by testing the R-squares value to show how much percentage of the exogenous variable determination coefficient influences the endogenous variables in the model that has been created. The R-squares value obtained in the test using Smart-PLS is 0.650, so it can be interpreted that the net benefit construct can be influenced by 65% by the System Quality, Information Quality, Service Quality, System Usage, User Satisfaction, Management Support, Vendor Support and IT Capabilities constructs, where the remaining 35% is likely influenced by other variables not included in the structural model of this study. The next step is to see the significance of the path coefficient path to see the direction of the relationship between variables in the results of the t-statistic test, which can be obtained through the bootstrapping test (resampling method). The bootstrapping test is carried out to get the path coefficient value, original sample, standard deviation, t statistic, and p value, which can be seen in Table 6.

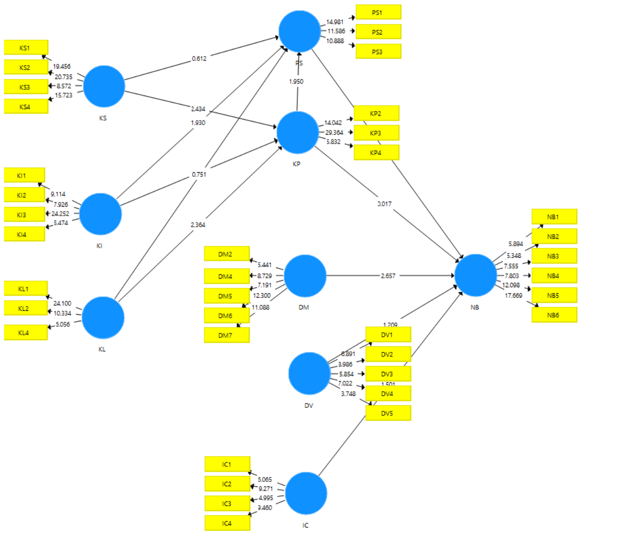

Figure 3. Test results between constructs AND latent variables

Table 6. Hypothesis path *t statistics* values

	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
PS -> NB	0.380	0.367	0.137	2.767	0.006
KS -> PS	0.110	0.090	0.179	0.612	0.541
KS -> KP	0.312	0.298	0.128	2.434	0.015
KP -> PS	0.350	0.348	0.179	1.950	0.052
KP -> NB	-0.004	0.017	0.229	0.017	0.987
KL -> PS	-0.116	-0.101	0.155	0.751	0.453
KL -> KP	0.290	0.304	0.123	2.364	0.018
KI -> PS	0.365	0.373	0.189	1.930	0.054
KI -> KP	0.320	0.328	0.162	1.970	0.049
IC -> NB	0.246	0.231	0.164	1.501	0.134
DV -> NB	0.117	0.122	0.097	1.209	0.227
DM -> NB	0.329	0.321	0.124	2.657	0.008

Based on Table 6 and Figure 3, it can be seen that there are five influences between variables/constructs in the model which are said to be significant after testing the relationship between constructs at a 95% confidence level, including 1) The Influence of System Quality on User Satisfaction. The significance value ∝ = 0.05 with two-tailed testing obtained the T_statistic value (2.434) > T_table (1.96) or P_value (0.015) < ∝ (0.05) so that System Quality has a significant effect on User Satisfaction (H_o is rejected and H_1 is accepted); 2) The Influence of Information Quality on User Satisfaction. The significance value ∝ = 0.05 with two-tailed testing obtained the T_statistic value (1.970) > T_table (1.96) or P_value (0.049) < ∝ (0.05) so that Information Quality has a significant effect on User Satisfaction (H_o is rejected and H_1 is accepted); 3) The Influence of Service Quality on User Satisfaction. The significance value ∝ = 0.05 with two-tailed testing obtained the T_statistic value (2.364) > T_table (1.96) or P_value (0.018) < ∝ (0.05) so that Service Quality has a significant influence on User Satisfaction (H_o is rejected and H_1 is accepted); 4) The effect of System Use on benefits (Net Benefit). The significance value ∝ = 0.05 with two-tailed testing obtained the T_statistic value (2.767) > T_table (1.96) or P_value (0.006) < ∝ (0.05) so that System Use has a significant effect on Benefits (H_o is rejected and H_1 is accepted); 5) The Influence of Management Support on Benefits (Net Benefit). The significance value ∝ = 0.05 with two-tailed testing obtained the T_statistic value (2.657) > T_table (1.96) or P_value (0.008) < ∝ (0.05) so that Management Support has a significant effect on Benefits (H_o is rejected and H_1 is accepted)

Hypothesis testing results

This study tested 12 hypotheses by comparing the values and values (1.96) to see the significance level. The hypothesis was stated to be accepted based on the value (>1.96 or <0.05) at a 95% confidence level. Conversely, the hypothesis was stated to be rejected based on the value (<1.96 or > 0.05) at a 95% confidence level.

Table 7. Hypothesis Testing Results

Hubungan	Hipotesis	$T_{statistic}$	T_{tabel}	Kesimpulan
KS →PS	H1	0.612	1.96	Ditolak
KS →KP	H1	2.434	1.96	Diterima
KI →PS	H3	1.930	1.96	Ditolak
KI →KP	H4	1.970	1.96	Diterima
KL →PS	H5	0.751	1.96	Ditolak
KL →KP	H6	2.364	1.96	Diterima
KP →PS	H7	1.950	1.96	Ditolak
PS →NB	H8	2.767	1.96	Diterima
KP →NB	H9	0.017	1.96	Ditolak
DM →NB	H10	2.657	1.96	Diterima
DV →NB	H11	1.290	1.96	Ditolak
IC →NB	H12	1.501	1.96	Ditolak

Table 7 above describes the results of the hypothesis testing as follows:

1) Hypothesis 1: There is no influence of System Quality on System Usage
2) Hypothesis 2: There is an influence of System Quality on User Satisfaction
3) Hypothesis 3: There is no influence of Information Quality on System Usage
4) Hypothesis 4: There is an influence of Information Quality on System Usage
5) Hypothesis 5: There is no influence of Service Quality on System Usage
6) Hypothesis 6: There is an influence of Service Quality on User Satisfaction
7) Hypothesis 7: There is no influence of User Satisfaction on System Usage
8) Hypothesis 8: There is an influence of System Use on Benefits
9) Hypothesis 9: There is no influence of User Satisfaction on Benefits

10) Hypothesis 10: There is an influence of Management Support on Benefits
11) Hypothesis 11: There is no influence of Vendor Support on Benefits
12) Hypothesis 12: There is no influence *of IT Capabilities* on benefits.

DISCUSSION

Determination of information system needs planning

Judging from determining system needs planning, the SINKARKES implementation policy at Pangkalpinang Port Health Office is implemented top-down. The top-down approach model begins by defining the targets and policies of system implementation. The next stage is carried out by analyzing the information system's needs. After the information system needs are mapped out, the stages of determining output, input, database, operating procedures, and system controls will continue [15]. The top-down approach in the implementation of SINKARKES can be seen from the system planning stage to the implementation process based on an overview analysis carried out by the Directorate General of P2P, Ministry of Health of the Republic of Indonesia, as the initial idea giver. The head office and vendors play a more dominant role in regulating the running of the system so that the role of the work unit does not have a direct influence on the stages of the system development life cycle, which includes the planning, analysis, design, implementation processes and only acts as a recipient of decisions from the results of the system implementation without knowing the system development process from start to finish.

With a top-down approach in planning SINKARKES needs, the Pangkalpinang Port Health Office as a user work unit must continue to use the existing system without being able to consider implementation decisions in terms of system quality, information quality, and service quality because SINKARKES is used as the main system in supporting the main tasks and functions of port health office. According to [16], the architectural planning of an information system must be based on the basic concepts of information system implementation management, what data will be collected, how the data algorithm is collected, where the data is located, and how the data delivery process and storage management are so that it can become a foundation in building a complete system.

Ideally, the previous architectural planning stage is preceded by communication between the Directorate General of P2P, the central unit and initiator of the system, the vendor, the developer, and the Port Health Office, the work unit that uses it. This determines the preparation of the master plan based on each port health office's classification needs. Thus, the planning of needs can support good system design, the development of an appropriate system, and implementation based on organizational needs.

Determination of information system development

From the perspective of developing information systems, the SINKARKES development process follows a total-system approach, which is carried out centrally by developing the system simultaneously. This approach combines the needs of each user into one unit of need, which is ideal if the database design is not too complex. However, this approach is less effective when developing features and reports in SINKARKES.

The Directorate General of P2P can apply alternative approaches as system developers' central unit in post-implementation development. The approach used is to conduct development with a modular system (modular approach). This approach is a structured information system development model that breaks down complex systems into several simple parts or modules to develop the system based on module classification at the right time and according to needs [17]. Planners and developers must pay attention to important aspects in the post-implementation development of an information system and the heterogeneity of the location where the system is implemented so that its development must prioritize the connectivity of all system modules into one unit based on user characteristics at an area [17]. According to [18], all stakeholders in post-implementation system development must remain directly involved in improving and adjusting the system. Active participation from individual users and organizational entities describes needs based on business work processes (software, hardware, information, etc.). Using this approach, the Directorate General of P2P as a developer can map user needs at the port health office level as a basis for developing or improving features in SINKARKES with a new data model that represents user needs in each work unit based on their classification.

CONCLUSION

Factors that significantly influence the success of SINKARKES implementation are system quality towards user satisfaction, information quality towards user satisfaction, service quality towards user satisfaction, system usage towards net benefit, and management support towards net benefit. This shows that the better the quality of technology, information, and services, the higher the user satisfaction, so efforts are needed to improve system quality, information quality, and service quality to support user satisfaction using SINKARKES and management support in supporting its development.

The implementation of SINKARKES uses a top-down approach, developing and adjusting a system that runs as a whole (total approach). This approach model is considered not ideal for the characteristics of the complex Health Quarantine Information System module. However, it must be implemented in all Port Health Offices with classifications and differing work areas.

As a user unit, the Pangkalpinang Port Health Office needs to adjust and prepare design proposals to improve SINKARKES features according to its field needs. Furthermore, it needs to maximize management support for implementing and developing SINKARKES and planning and procuring supporting infrastructure.

The Directorate General of Disease Prevention and Control of the Indonesian Ministry of Health, as a developer, needs to develop SINKARKES features by conducting further research related to analyzing the causes and impacts of information system problems, problem-solving, and their potential based on each available module and the classification of the port health office's scope of work in the region. Furthermore, the vendor must improve the system's quality further and provide excellent service to users if there are technical problems.

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