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The Impact of ERP Implementation on User Satisfaction while Working from Home during Mass Movement Restrictions

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Abstract:

As the COVID-19 pandemic intensified in Indonesia in 2020, companies and organizations have devised measures in order to adapt with the absence of physical workforce presence in the workplace, including implementing work-from-home (WfH) regimes, where the employee conducts work operations from their residence. Adapting into a new working environment, however, is often a considerable challenge for companies and organizations of all stripes, especially in ensuring that users can properly adjust themselves and maintain a degree of work efficiency. The work efficiency of users while using an widespread and integrated company business solution, especially enterprise resource planning (ERP) software is often measured by the overall satisfaction of each user. To measure user satisfaction while using an ERP-based enterprise resource management system for work-from-home operations, this research attempts to conduct a survey in an institution or organization that has been sending employees to work from home by collecting responses from employees. The questionnaire will have each respondent evaluate the three relevant variables (benefits, risks and barriers) while using the ERP based system to work from home, which will then be used to measure its correlation with the users' satisfaction relative to the three factors using the one-way ANOVA correlation method. Research results have yielded a positive correlation between the variables of system effectiveness and user satisfaction, indicating that the use of ERP is generally satisfactory to its

users and that ERP systems prove beneficial in assisting organizations in their WfH regime, within the restrictions of a public health issue and beyond.

Keywords: Enterprise resource planning; benefits; risks; user satisfaction; barriers

Introduction

The COVID-19 pandemic outbreak in early 2020 has significantly affected workforce mobility in countries across the world. In Indonesia, the government introduced movement restriction measures with the intent of curbing the spread of the COVID-19 virus among the general populace, and such movement restrictions have forced formal workplaces to shift into partial or full remote working regiments. The sudden change brought upon by this mass movement restriction demands the workforce to be able to adapt quickly in a rapidly changing situation at a short period of time. An organization therefore must be able to provide an adequate workplace system to be able to help their employees and dependents adapt swiftly and efficiently. However, the situation with the COVID-19 have brought upon unprecedented changes in the nature of how employees in formal work sections communicate and operate due to restrictions on human-to-human interaction. As a result, companies shifted to working from home where employees can perform workplace operations in

their homes, typically using an online-based integrated corporate system (Yuksel, Aydede & Begolli, 2020).

During such uncertain conditions, the greatest challenge of working from home is adapting to a rapidly changing situation to maintain a level of efficiency prior to the movement restriction period. The company (or employees') facilities must be able to adequately support operations and peer-to-peer communication in order to maximize workforce efficiency. One such solution to help company systems support WfH activities is the implementation of ERP systems (Tan et al, 2020).

ERP is a widespread business solution implemented by companies and organizations to

help increase or maintain their operational efficiency. According to Wicaksono et al (2015), over the past decade, the use of ERP-based systems in Indonesia has experienced sizeable growth. ERP software is one of the most popular forms of business solutions for Indonesian business and educational organizations, and its flexibility have proven useful in helping both user and company in running daily operations. By 2027, it is estimated that the use of ERP will nearly double, owing to the increase of reliance on remote working systems due to the pandemic. As movement restrictions began affecting more businesses and organizations in Indonesia, the role of ERP as well as its rapid growth cannot be understated in helping maintain user satisfaction and corporate work efficiency.

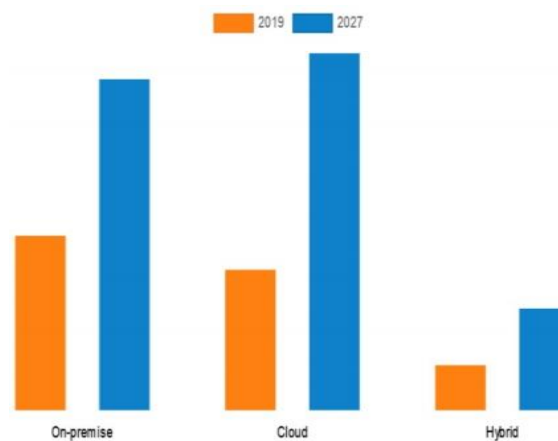


Figure 1. Estimated growth of ERP-based system usage in organizations after the COVID-19 pandemic. (source: <https://www.alliedmarketresearch.com/erp-market>)

The purpose of his paper is to identify and determine how the implementation of ERP affects employee performance, measured through the users' satisfaction of the ERP-based system performance while working from home in Indonesian companies and organizations. The increasing reliance on business solutions provides an incentive to measure the overall success of the interaction between system and user becomes vital in formulating how an organization can approach their system implementation, as well as formulating better implementation strategies in the future.

Once organizations have a better understanding of their system's performance,

the organization will be able to decipher vital information to help them devise more effective and beneficial approaches. As such, it is important to identify how the use of a business solution software such as ERP can affect the performance of users and employees interacting with a system derived from the ERP-based business solution to provide a clearer picture of business software implementation in the future.

The research model will be based on Saatcioglu (2009)'s user satisfaction analysis model, calculating the satisfaction value of users in an ERP-based system from three variables: barriers, risks and benefits which

ultimately reveals the correlation between the general satisfaction of users while performing daily operations in a work from home setting as well as the three factors of user interaction elements while operating the system. User satisfaction in particular is a viable measure of ERP efficacy on daily operations as a whole, mainly from the increasing prevalence of ERP-based systems within a corporate environment, and also deducing the perceptions of how each user can receive the potential benefits that ERP offers directly to stakeholders (Wailgum, 2008).

Literature Review

Definition of ERP

ERP can be defined as a collection of methods, tools and/or instructions to help an organization integrate the built-in system's functions to help achieve their operational requirements (Klaus & Gable, 2005). An ERP system is designed to supersede separate functions found in older system architectures and introduce an integrated architecture that can communicate information and data much more efficiently and allocate personnel to an activity according to their specializations. The interactivity between user and system becomes a critical point in determining the overall success of an ERP system within an organization as well as its applications in general user support under any given circumstances (Usmanij & Chu, 2006).

The Benefits and Success Factors of ERP in an Organization

The main purpose of implementing ERP in an organization's system is to increase organizational performance by introducing a system architecture that can support the organization in every operational level, including data management, human resource allocation and financial and operational information recording. The main benefit expected from ERP implementation is to help an organization in decision-making to maximize efficiency and performance (Bradley & Lee, 2007).

The prospect of ERP implementation and the benefits it offers can be very promising

for organizations seeking to improve their productivity and workforce efficiency. However, it must be noted that ERP implementation presents its own set of risks. As a high-level information management architecture with complex mechanisms and architectural features, a wide array of issues can occur within an organization with inadequate preparation in approaching their system implementation, such as incompatibility with the organization's operational workframe (Staeher, Shanks & Seddon, 2009), reluctance and/or resistance to change within the organization's workforce and inadequate training resulting in lowered efficiency (Lee, Lee & Chung, 2010). As such, a company must be able to adequately train and prepare their workforce to be able to adapt and operate in a new ERP-based system environment and ensure that communication can remain streamlined and free of general problems (Hardill & Green, 2003).

The Challenges of Working from Home

The widespread practice of working from home is the direct effect of the COVID-19 pandemic in 2020, which demands that people must reduce their mobility in order to curb the spread of the transmissible disease. Employees in formal workplaces are expected to be able to swiftly adapt to their new work environment, which typically involves remote communication

Through web meeting applications such as Microsoft Team, Cisco Webex and Zoom. As the communication experience of each employee varies widely, this could pose a problem to a company that accustomed to remote working practices (Momoh, Roy & Shehab, 2011).

ERP is one of the possible solutions in overcoming the challenges of working from home that results in a major alteration of working space, habits and even psychological ramifications of human users (Seo, 2013). As the system provides a more concise architecture for increased efficiency and providing clearer guidelines in technological usage, a well-implemented ERP based system can be a critical

component in a determining the success of a work-from-home regiment.

User Satisfaction Correlation Research Model

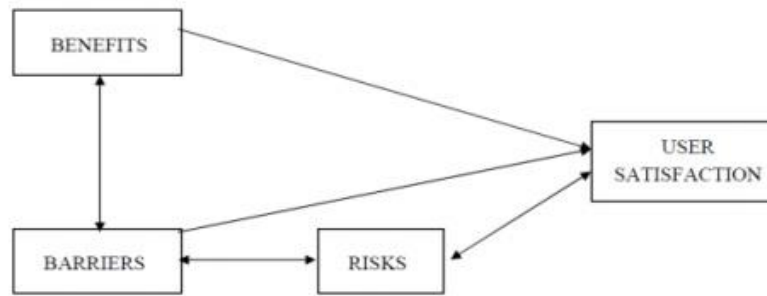


Figure 2. The research model of determining user satisfaction in an ERP based system after Saatcioglu (2009)

This research’s model will be formulated based on the analysis performed by Saatcioglu’s paper on a Swiss corporation in 2009, which identified three variables (benefits, barriers and risks) that affects user satisfaction in an ERP system implementation within an organization. The three variables mentioned from Saatcioglu’s research ultimately determines the final overall satisfaction of users interacting with the organization system positively, especially from the perspective of potential benefits. This research, however, will attempt to identify the other present variables, namely risks and barriers, to ensure that user satisfaction in in themidst of a rapidly changing situation can be

Properly assessed. Saatcioglu’s model is chosen for this research for its concise definition of variables that affect the satisfaction of users within an ERP system. The variables mentioned in the model can translate into ERP-based systems implemented within companies running a WfH operation, which require a heavy degree of interaction between system and users. The three factors (benefits, risks and barriers) become easily identifiable among users that have experienced WfH regimes.

User Satisfaction Variables

As described in the previous subsection, the main variables that will be analyzed in this research consists of three fixed variables (benefits, barriers and risks) that ultimately affects user satisfaction while utilizing the ERP-based system in a work from home environment.

These variables will be used to derive questionnaire items that will be used as an instrument of research within the organization, with the values collected from benefits, risks and barriers items determining the user satisfaction value.

Benefits

Benefits are the positive effects or outcomes expected to be received by users while interacting in an ERP-based system. The main goal of implementing the ERP system is to help the user achieve a higher degree of operational efficiency (Deshmukh, Thampi & Kalankar, 2015) through assisting or enhancing communication reliability (Massaro et al, 2018), increasing the speed and precision of data processing to provide a better workplace environment (Hong et al, 2012) while maintaining a high degree of user friendliness (Rahnavard & Bozorghkou. 2014).

Barriers

Barriers include the possible detrimental factors that users may encounter while using the ERP system for business process and transactions. Users may experience technical issues including connection problems with the system while executing transactions or running the system software, while other issues may be caused by a lack of comprehension in operating the system GUI or software on the users’ end (Singh, Spiers and Beasley, 2011). From a non-technical

standpoint, barriers may be caused by the lack of motivation from users to work from home with an ERP based system or and the lack of clear communication between users, which may cause incomprehension in operating the system and ultimately the business operation procedures (Basso et al, 2018).

Risks

Risks are the identifiable threats and factors that can negatively impact how the user interacts with the system. One of the risks include reduction in employee work efficiency while working from home due to their inability to adapt in the work environment, which may leave a poor impression on the users’ perception of the ERP system (Kvon et al, 2017). Others include technical issues such as online communication breakdowns, lack of adequate technological infrastructure for operations and users failing to comprehend operational basics, resulting in work stagnation (Yucel et al., 2012) (Baykasoğlu & Gölcük , 2017).

User Satisfaction

Ultimately, the purpose of this research is to determine the users’ overall satisfaction

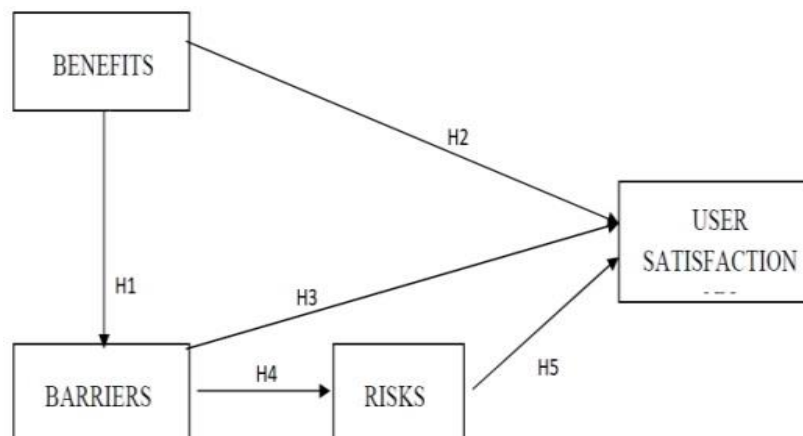


Figure 4. The modified research model based on Saatcioglu (2009)

The diagram above describes the variables that will be used to determine the hypotheses about the effects of ERP on the performance of employees while working from home, which will be measured by user satisfaction. The research will be measured using the quantitative method based on 20

while working from home and interacting an ERP-based system as their primary means of operation. Some of the important factors in determining user satisfaction include the users’ reception of the content and interface format provided in the system, the benefits received or perceived by the users, the accuracy of the system while performing transactions and aiding business processes and the user-friendliness of the system (Doll & Torkzadeh, 2012) (Barton & Sinha, 2017).

Methodology

Research Model

The research uses a two-way correlation analysis to determine how user satisfaction variables while using an ERP based software affects WfH performance. The variables are determined based on McLean’s IS Success Model [24], which also determines the question items that will be presented in the questionnaire for distribution in the company. The variables that will determine the effectiveness of ERP implementation are user satisfaction and perceived functionality of the system while the program assists the user while working from home.

items on a questionnaire. Each item question will be used to weigh in the final measure of user satisfaction based on three variables: benefits, barriers and risks. (Dezdar, 2012) According to Griffiths (2011), there are three factors that determine user satisfaction while using a system: the user’s personal experience

with the system (user satisfaction), the benefits received through increase in work effectiveness (benefits) and the performance of the system itself, including its risks and barriers.

Research Instrument

The research will be conducted using a 20-item questionnaire that will be distributed among the employees of the financial and control sectors of the company. The questions are divided into four variables each with five question items: the employee's personal experience while using the ERP based system for WfH operations (benefits and barriers) and the direct impact of using the system on their work effectiveness and satisfaction (risks and user satisfaction). The questionnaire is measured using the Likert scale to determine the employees' degree of satisfaction or compliance with each variable.

Variables and Indicators

The research assumes the independent variable x = ERP impact on WfH effectiveness based on the user's experience while using the system and the determinant variable y = ERP based system user satisfaction. The correlation of both variables is determined using the one-way ANOVA test, which will also decide which hypotheses to accept or reject whether the correlation of WfH based system on user satisfaction is significant or not (Zviran, Pliskin & Levin, 2005). Values from the questionnaire will then be multiplied by 1.33 times for the x variable, while the y variable will be adjusted by a four-fold multiplication to ensure that the proportion is equal to the 120-point maximum value obtained from the 20 questions of the 6-point Likert scale.

The research will also run a Pearson's correlation test to determine the correlation value between the two variables.

Research Hypotheses

The hypotheses that will be tested on this research are: H_0 = ERP has no noticeable effect on employees' work effectiveness. H_a = ERP has a noticeable effect on employees'

work effectiveness and satisfaction while working from home.

If the p-value from the resulting ANOVA test between the variables is less than 0.05, the H_a hypothesis can be accepted and thus one can conclude that the use of ERP-based system has a substantial effect on work effectiveness during the WfH period. Conversely, if the resulting p-value from the ANOVA test is above 0.05, the H_0 hypotheses cannot be rejected, implying that the correlation between the two variables is likely insignificant.

Meanwhile, the following hypotheses based on the research model will be used to determine the correlation between each questionnaire variable above:

- H1: The benefits acquired while using ERP systems can reduce the number of barriers encountered.
- H2: The benefits from using ERP system affects user satisfaction.
- H3: Barriers within the ERP system can negatively affect user satisfaction.
- H4: Barriers within the ERP system may cause risks
- H5: The possible risks that emerge while using the ERP system can affect user satisfaction

Data Source

This research draws the data sample from the population of multiple companies that uses an ERP based system to aid their work from home procedures in Indonesia. The answers from the first fifteen questions from the questionnaire are then tabulated for further processing as the determinant variable, while the last five questions are the dependent variable. The questionnaire managed to retrieve 215 responses from a wide array of respondents, mainly from the IT and oil and gas industry, which will be discussed in the next section.

Results and Findings

Questionnaire Data Results and Descriptive

Data Analysis

After spreading the questionnaire to various companies in randomized sampling,

215 respondents have filled in the questionnaire. The diagrams below explains the general demographic outline of the respondents, including the industry and field of their occupation and the type of ERP software used by the respondents.

QUESTIONNAIRE RESULTS: WORKFORCE FIELD

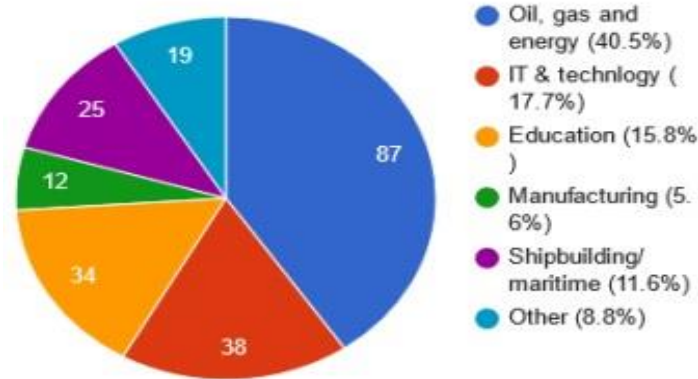


Figure 5. Workforce field of respondents

The diagram above shows that the majority (roughly 74%) of the respondents work in the IT/Technology, educational and energy sector. This indicates that the usage of

ERP software is mainly concentrated on fields requiring intense data and human resource management.

QUESTIONNAIRE RESULTS: ERP SOFTWARE USED

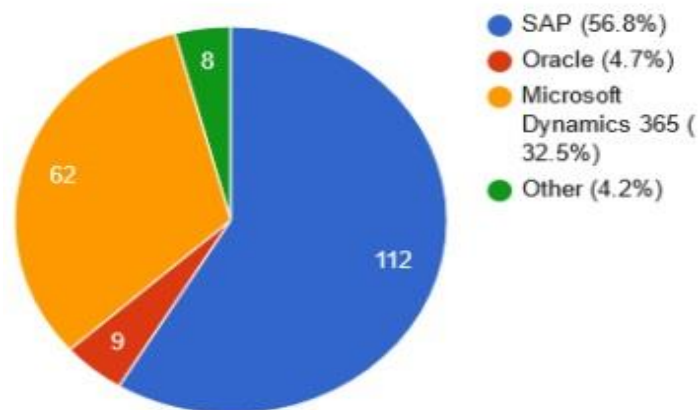


Figure 6. ERP software used by respondents

The result from the diagram indicates that the vast majority of respondents in Indonesia used ERP SAP and Microsoft Dynamics 365 as the primary ERP software Used for working from home.

The mean value of the x variable (ERP impact on WfH performance) is 69.8 out of 90, which implies that the majority of respondents found the impact of ERP software to be positive in their work performance, while the y variable (user satisfaction on ERP usage

for WfH) has yielded an average of 24.47 out of 30. The median value of the questionnaire is 5 (agree), indicating that most of the users have found ERP systems to be very satisfactory in helping WfH operations.

Validity Test Results

The CITC tests run for testing the validity of the question items have yielded the following results:

Item-Total Statistics				
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Q1	92.53	106.515	.780	.947
Q2	92.66	107.136	.625	.949
Q3	93.16	106.330	.510	.952
Q4	93.41	106.701	.496	.953
Q5	92.50	109.548	.596	.949
Q6	93.16	105.168	.729	.947
Q7	92.75	107.161	.675	.948
Q8	93.22	104.564	.694	.948
Q9	92.91	106.733	.699	.948
Q10	92.91	109.959	.521	.950
Q11	92.75	109.484	.654	.949
Q12	92.75	108.194	.758	.947
Q13	93.00	105.613	.779	.947
Q14	92.94	105.286	.888	.945
Q15	92.81	106.351	.840	.946
Q16	92.69	109.383	.736	.948
Q17	92.78	108.047	.808	.947
Q18	93.06	104.964	.721	.948
Q19	92.63	108.177	.777	.947
Q20	92.66	107.136	.818	.946

Table 2. Individual question CITC test results

Reliability Statistics

Cronbach's Alpha	N of Items
.951	20

Table 1. CITC value

The results above have demonstrated that each instance of the question item used in this analysis can be considered valid, as the Cronbach’s Alpha value for all 20 instances have been found to be above 0.60 (0.951). Individually, each question item has yielded a CITC r value higher than $n=18=0.468$, and thus this questionnaire can be considered viable for this research.

Correlation and ANOVA test Results

To provide a clearer picture of how the two variables correlate with each other, this research has ran a Pearson’s correlation test on the two variables, yielding the following results:

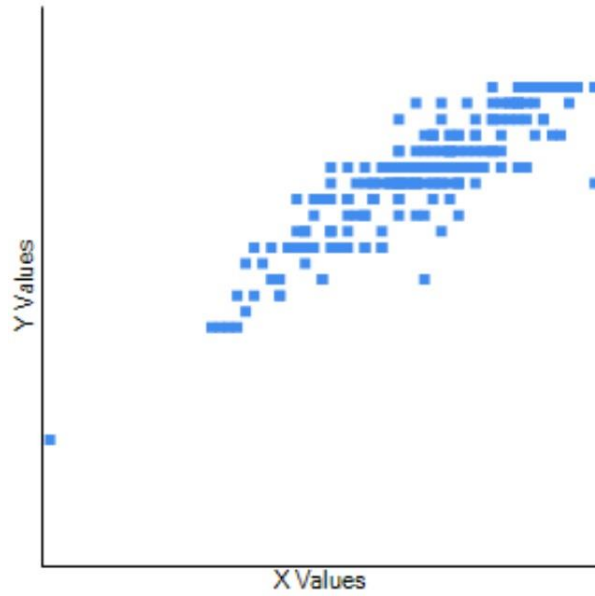


Figure 6. Pearson’s correlation test diagram results (R= 0.8873)

The results of the Pearson’s correlation test above demonstrated that there is a significant positive correlation between the X value (ERP impact on WfH) and Y value (user satisfaction with ERP while working from home). The R value of 0.8873 also indicates that the correlation between the two variables is very strong.

Next, the one-way ANOVA test yielded results in the table below. The test is ran between the two sets of x and y data variables, adjusted to ensure the values are parallel to the 120-point questionnaire maximum value.

SOURCE	DF	SUM OF SQUARE	MEAN SQUARE	F STATISTIC	P-VALUE
Groups	1	2742.9836	2742.9836	12.8564	0.0003751
Error	428	913116.1923	213.3356		
Total	429	94059.1757	219.2522		

Table 3. One-way ANOVA test result between the two variables

The result of the ANOVA test has yielded a P-value of 0.00037, far below the threshold of 0.05 to reject the H0 hypotheses from earlier. Thus, it can be concluded that the alternative hypotheses $H_a = \text{ERP}$ has a noticeable effect on the performance of users in work-from home environments is acceptable, and that the correlation between the impact of ERP and its satisfaction of users is noticeable, and positive.

Conclusion

Findings

Analyses run from the set of data acquired from companies running work-from-home operations during the COVID-19 pandemic in Indonesia to compare the correlation between the impact of ERP usage and the satisfaction of users while working from home have demonstrated that the implementation of ERP-based systems have resulted in a positive impact in the users' performance while working from home. From the Pearson's correlation analysis, the value of γ (ERP impact on performance) has a significant positive correlation with x (user satisfaction), while the ANOVA tests have resulted in a conclusion where the null hypothesis that ERP implementation have no or negligible effect on user satisfaction can be rejected, and that the role of ERP systems in working from home is significant enough to help increase the productivity and performance of users.

From demographical statistics, it can be inferred that the majority of respondents engage in occupations in the education, IT/technology, and the energy sector in Indonesia, comprising of up to 74% of the respondents. Meanwhile, the most widely used ERP system in Indonesia is by far the SAP ERP system, which make up a little over half (56.8%) of the respondents. Almost every respondent (95%) has been working from home for

over two months in the past several years of the COVID-19 pandemic.

The question item with the lowest mean value from the Likert scale is Question 8: "The ERP system is generally free of connectivity issues that can otherwise cause delays in transaction and communication.", indicating that the most common issue faced by ERP users in Indonesia in general is connectivity issues between the user and system, which will be discussed in the next section.

The result of the both the analytical data tests and demographic analysis of this questionnaire have positively indicated that the use of ERP software have been instrumental in aiding employees in various sectors, especially on fields reliant on heavy data processing such as IT/technology and the energy industry, to perform, process and aid the operational activities of working from home.

Conclusion and discussion

From the results mentioned in the previous section, it can be concluded from this research that ERP systems have overall positively impacted the workforce of Indonesian employees in the technology-friendly sector with adequate user satisfaction, from the three factors determined in the beginning of the research:

1. ERP-based systems has provided tangible benefits to users while working from home.
2. ERP-based systems successfully overcame its barriers to aid users in business operations.
3. The risks associated with ERP systems have been mitigated to meet user satisfaction requirements.

As technology and people rapidly change, the requirements in properly implementing and

running a system that can help business operations change accordingly. The widespread use of ERP systems in Indonesia also indicates that corporations and organizations are undergoing a rapid transformation in user-to-technology interaction, human resource management as well as peer-to-peer communication. In the past two years, the COVID-19 pandemic have forced companies and organizations to operate home in order to prevent the spread of a virulent and novel transmissible disease that could potentially threaten the health of employees and other dependents in a work environment.

It is important for companies and organizations to be able to implement a system that can adequately support a rapidly changing business environment that can provide a tangible benefit through users and maintain a high degree of satisfaction from users. ERP systems are one such example, which not only provide benefits in improving work efficiency for users, but also present a number of risks and barriers, which if implemented properly as the questionnaire results show, can prove to be an opportunity for users to review the possible shortcomings of an ERP system for improvements once the system development life cycle enters the maintenance stage.

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