

## THE SUCCESSFUL IMPLEMENTATION OF KEY PERFORMANCE INDICATOR SYSTEM IN A TELECOMMUNICATIONS COMPANY

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### ABSTRACT

*Despite technological advances and extensive research, system implementation failure is still the cause of concern for many business organisations. Hence these organisations could learn from many examples of success stories in the information system implementations. This paper presents a case study of the successful implementation of a KPI System called KPIS-NE, by Nada Suria Co., Ltd. The main focus would be to understand the purpose of the system, how it was developed, what is the technological infrastructure needed to implement it, and what is the impact of its implementation on the company and its employees. The system was introduced to promote a culture of performance in NS and to ensure a transparent performance appraisal. It is a secure web-based system which is accessible anywhere and anytime. The development of KPIS-NE was based on the Waterfall System Development Methodology. To ensure the system's efficiency and effectiveness, KPIS-NE was pilot-tested for a period of 6 months. Upon completion, a study was conducted using interview and document analysis methods to assess the system's success. The feedback shows that the system has garnered positive responses from the employees and the system's owner despite the existence of several issues and challenges that need to be addressed.*

**Keywords:** *KPI System, Performance Appraisal, IS Success, IT Infrastructure, IS Implementation Issues, System Development Methodology*

## INTRODUCTION

No one can deny the tremendous impact of Information Technology (IT) and Information Systems (IS) on organisations and business firms. IT and IS have changed the organizational structure, working culture, business operations and decision making, business models, and so forth (Cooke, 2003; Mukherji, 2002; Gurbaxani, & Whang, 1991). The emergence of the Internet has revitalized the communication and collaboration culture between and among companies and employees (The Economist, 1999). Studies have proven that many companies have been very successful in business due to effective use of IT and IS (Kivinen, & Lammintakanen, 2013; Middleton, 1995). Similarly, there are also cases where companies are losing substantial amount of money due to poor implementation of IT and IS (Yeo, 2002; Nouman, Aziz, & Ishaq, (2009).).

IS has been used extensively by organisations and companies for different purposes. Departments and functional areas such as human resources, sales and marketing, production and planning, accounts and finance, and quality control are using different IS to fulfill their unique functions and operational needs. Millions of US dollars are spent on IT infrastructure and IS to enhance business operations and decision making. The changing nature of IT and Internet technology requires continuous investment from companies in order to stay relevant and competitive in business. As such, companies and organisations need to plan and implement IS carefully in order to minimize the risk of failure (Intel Corporation, 2009). Returns on investment on IT and IS are certainly the main priority for all companies.

Scholars in the IS area had conducted many studies into the successes and failures of IS. As a result, theories are developed as references for researchers and practitioners. IS success factors model developed and revised by Delone and Mclean (2003) constitute one of the most referred to models in the IS area. According to this model, the success of IS depends on several factors which include information quality, service quality, system quality, intention to use, user satisfaction and net benefit. This model enables companies to be aware of the important factors which should be taken into account when embarking into IS projects. In addition, companies can also benefit considerably by learning from others which have implemented IS successfully. This paper therefore presents a case study of Nada Suria Co., Ltd., a large telecommunications company in Malaysia which has successfully implemented many IS including the most recent one, the Key Performance Indicator System

for Non-Executives (KPIS-NE). Success factors, the system development methodology used, issues and challenges faced, and future planning will consequently be discussed.

## **COMPANY BACKGROUND**

Nada Suria Co., Ltd. (NS) is one of Asia's leading telecommunication companies with a market capitalisation of RM 13.9 billion and a workforce of more than 15,000 employees. Better known as NS, it is one of the largest telecommunications companies in Malaysia and is always well known for its mobile service offering. The mobile service segment in the telecommunication sector has always been the main focus for NS. The company has always been successful in business. By the third quarter of 2013, for example, NS had recorded a 9.9% revenue growth to RM2.5 billion.

The company was first established in 1985 and was listed on the Malaysian Stock Exchange (Bursa Malaysia) in 1995. Despite its status as a private company, NS is one of the successful Malaysian Government's Linked Companies (GLC). Hence, some of its business decisions or corporate strategies are aligned with Malaysian government direction and policies.

To keep up with the fast paced technology change in the telecommunication sector, NS has established itself as an Internet provider and now emerges as a premier high speed broadband (HSBB) provider. Currently, the consumer segment contributes the biggest market share for NS with a 35% contribution towards NS's revenue. Other market segments, such as Small Medium Enterprise (SME), Enterprise, Government, Wholesale and Global provided much smaller contributions and NS focuses on generating most of its revenue from the consumer segment.

## **SETTING THE STAGE**

### **Rationale and Purpose of the KPI System**

The KPI system is already available for the executives of NS. Non-executives have to fill in their performance indicators, measurement and achievements manually on a form and submit them to their HR office. The number of non-executive personal is more than ten (10) thousand, most of which are not computer savvy due to the fact that their average

age is more than 40. Because of this, it is much easier for them to fill in the form manually and submit it to their respective Human Resources Department.

As time goes by, most of the processes have gone online. With paperless initiatives now being the norm, the need to computerize the manual processes is crucial. This can help reduce the cost of maintaining the storage warehouse and can also help improve search capability. In 2007, the non-executive union agreed with Human Resources to implement a KPI system for its non-executive staff. When using this system, the KPI of each member of staff can be recorded and tracked at the end of the year. Those who are active outside the scope of their jobs can also record their involvements in sports activities and clubs. All these will be highlighted by the management during the evaluation process, which will allow regional staff to be recognized by the management. Consequently, the introduction of the KPIS-NE was timely and justified.

### **Objectives and Methodology**

The objectives of this case study can be broadly classified as follows:

- 1) To assess the IT infrastructure and IS currently employed within NS which support the pre and post implementation of KPIS-NE.
- 2) To identify the factors which contribute to the successful implementation of KPIS-NE from 'planning' until the 'roll over' stages.
- 3) To assess the overall impact of KPIS-NE on organisation and employees. This also includes the assessment of employees' perception and acceptance of the KPI system.
- 4) To evaluate the issues and challenges faced by NS during and after the implementation of KPIS-NE.

In order to achieve these objectives, a research team of five members was formed which included an HR officer from NS who can obtain access to all the relevant information about the development and implementation of KPIS-NE. The main data collection method used was an interview survey with the system owner (an HR Department manager) and selected users of the system. A total of 20 users from different functional departments were involved in the interview. Apart from the interview data, the research team also collected and analyzed the relevant documents and minutes of the meetings which were related to the proposal, development, and implementation of the system. NS's corporate website was also one of the sources of reference during the data collection phase. In order

to speed up the data analysis process and to avoid data redundancy, several brainstorming sessions were conducted among the research team members using interview transcriptions and other collected documents. The following table summarises the methods, objectives, and outcome mapping in this case study.

Table 1

*Objectives, Methods, and Outcome Mapping*

	Objective	Method	Outcome
1)	To assess the IT infrastructure and IS currently employed within NS which support the pre and post implementation of KPIS-NE.	Document analysis (IT infrastructure and IS planning documentations)	Details on IT and IS infrastructure
2)	To identify the factors which contribute to the successful implementation of KPIS-NE from 'planning' until the 'roll over' stages.	Interview and document analysis (minutes of meetings)	List of factors for the successful implementation of KPIS-NE
3)	To assess the overall impact of KPIS-NE on organisation and employees.	Interview and document analysis (minutes of meetings)	List of impact of KPIS-NE
4)	To evaluate the issues and challenges faced by NS during and after the implementation of KPIS-NE.	Interview	List of issues and challenges faced by NS during and after KPIS-NE's implementation.

**Existing Information Technology Infrastructure**

As one of the largest companies in Malaysia, NS has a very complex IT infrastructure which consists of Data Center, High Speed Network, Application Development and Security Implementation. Each of the functions is managed and maintained by a dedicated team due to its complexity and the amount of its functionality. NS has invested millions of Ringgit in hardware, software, network and security tools.

NS has a number of Data Centers with different functionalities. The Data Center in Shah Alam normally hosts servers for development and testing purposes. The Data Center in Petaling Jaya mainly hosts the production servers for applications used internally or even externally.

The Kula Lumpur Data Center is currently almost fully occupied. A new Data Center in Tanjung Malim has been opened for the new Information System. It is equipped with a new infrastructure and a high speed network. The other Data Center, which is located in Cyberjaya, serves as a recovery and backup center. Most of the production or live Information Systems from the other Data Centers will have duplicate data in this Data Center. In the event of corrupted data, the system administrator will be able to restore back the latest backup data and this functionality is managed by a form of enterprise software called Veritas which enables an online backup and restore function due to the different locations of the Data Centers.

All these Data Centers are connected to high speed broadband in order to increase the performance of the Information System and to be able to transfer terabytes of data at lightning speed. High-end servers are used to implement the virtualization concept. Virtualization is where one big server has a smaller partition of servers running at the same time and each partition has its own operating system (VMWare, 2014). VMWare is the tool that NS currently uses for virtualization. VMWare has been the software leader in virtualization for the last 5 years and its close competitor is HyperV, as introduced by Microsoft in Windows Server. All these servers have an online hard disk connected to it, named San Storage. This allows the administrator to scale the size of the disk by adding a new hard disk to the machine so that it can be shared by all the servers. This also acts as a recovery tool, if data corruption occurs.

After having a state-of-the-art infrastructure, Information Systems are able to run smoothly, which eventually helps in improving and generating business operations. The enterprise systems and related technologies being implemented in NS are SAP, Oracle, IBM, VMWare, Veritas, and Sun Microsystem. Each of these has unique functions and is being maintained by hundreds of system administrators, system developers, and IT support staff.

One of the most important aspects of IT is security. It would be a waste of investment if all the high performance hardware and software could be easily compromised. NS has implemented an industry standard security policy in order to protect the infrastructure. They have an intranet network which can only be accessed inside the company office building. High risk systems are usually accessible inside this zone. Mobile staff can access the intranet network by using the Secured Virtual Private Network. For systems intended for customers, the servers are located

in the demilitarized zone (DMZ) or in perimeter networking. Online systems such as company site, email system, and billing system are normally intended for outsiders and are located in this zone. Only the front-end can be accessed, while databases and system integration can only be implemented and accessed inside the Intranet Zone. This is to avoid the risk of hackers accessing the sensitive data located inside the back-end system.

With regard to the KPI system (KPIS-NE) architecture, all the users are NS, which means they can log into the intranet site. The Human Resource Division requires the system to be accessed via a web browser and this can be done using any form of network access. There are two logical server partitions for the web pages which have a connection with Oracle Database. The two webpage servers are controlled by load balancing software which handles the incoming users and divides the workload between the two servers. Users outside the NS Intranet network can still access the system by using a secure VPN. For the purposes of user id, NS has an enterprise Single Sign On (SSO) application which helps NS staff to maintain only one user id and password for most of the online applications that exist in NS. The SSO also helps users update the same password for all the applications involved so that users will not have to remember multiple user ids and passwords. Coldfusion MX is used for the web application server running on Windows 2003 server. It uses the Oracle 9i Database which is already being implemented in TM. Figure 1 shows the overall architecture of the KPI system.

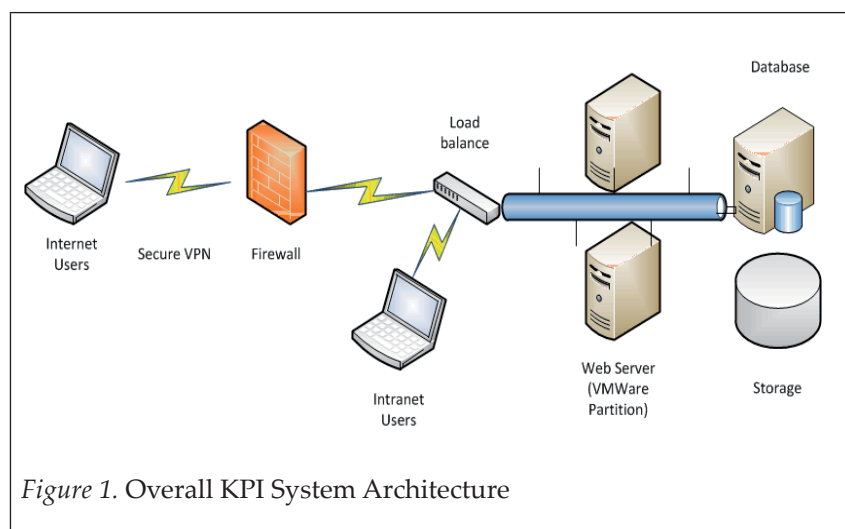


Figure 1. Overall KPI System Architecture

### **Information Systems Currently Available**

As mentioned before, NS has implemented a number of enterprise systems to help with the NS internal operations and processes which drive the NS business in the Telecommunication industry. SAP is used for human resource modules, supply chain modules, project management modules and also financial modules. For customer relationships, NS uses the Siebel application, which was acquired by Oracle in 2005 (Kawamoto & Kane, 2005). Siebel is also being used to develop the Billing system. All these enterprise applications support the general core business of NS and some have interfaces between which help to avoid data redundancy and data inaccuracy.

Along with these large applications, there are many other small systems that help fill in the gaps. Most of the systems are web-based applications which are developed in-house or by IT vendors. Examples of the systems include the Knowledge Management portal, the Contract Management system, various workflow systems, and KPIS-NE.

## **CASE DESCRIPTION**

### **About the System**

In order to create a culture of performance in an organization, NS rewards its employees who have excelled in their work performance. In order to do this, a proper performance appraisal system needs to be implemented. Using the statement formulated by the Group Human Resource Division, a project team comprising all the stakeholders was set up to develop and implement the performance appraisal system for non-executives. The system was then developed and named KPIS-NE as mentioned earlier.

KPIS-NE utilizes a three stage evaluation system. The first evaluation is conducted by the "Employees" themselves with the KPI and weightage attached. The second evaluation is by their "Immediate Superior" and the third is the "Reviewer". This is a web based system and throughout the evaluation period the employee is able to view their performance rating or score. This eliminates a considerable amount of ambiguity when it comes to the payment of bonuses, incentives, and promotions. KPIS-NE ensures that the evaluation is transparent and the Key Performance Indicators (KPI) are agreed upfront. To ensure its robustness and effectiveness, KPIS-NE was pilot tested for a period of 6 months. The overall processes



involved in developing this system are: Business Requirement (Need Statement), Planning (Functional Requirement Specification, System Design Specification, System Requirement Specification) and the development of the system infrastructure and testing. To assess the system's success, the team conducted interviews with selected employees and systems owners to record their "User experience" with the system. The feedback shows that the system implemented has garnered positive responses from both employees and systems owners.

### How it works

Basically KPIS-NE is a system for every employee to key-in a yearly target and the initiatives that they will perform in order to achieve the target. The KPIs are based on the Balanced Score Card which is cascading from top management to non-executive staff. The Balance Score Card was adapted from Kaplan and Norton (1997), which consists of four (4) different perspectives which are (1) Financial, (2) Customer (3) Internal Business Process and (4) Organizational Growth or Training.

The KPIS-NE has workflow functions which start when the user keys in their contracts or agreements for all their targets for the year. Then their supervisors approve the contract, and send it to the tracking stage. After tracking, the next stage is self-evaluation where an employee rates his or her own performance before sending it to the supervisor. The supervisor will then evaluate the staff and send the form to the reviewer. The reviewer will also evaluate the staff and later complete the process cycle by submitting the form to HR. Figure 2 is the overall system process flow.

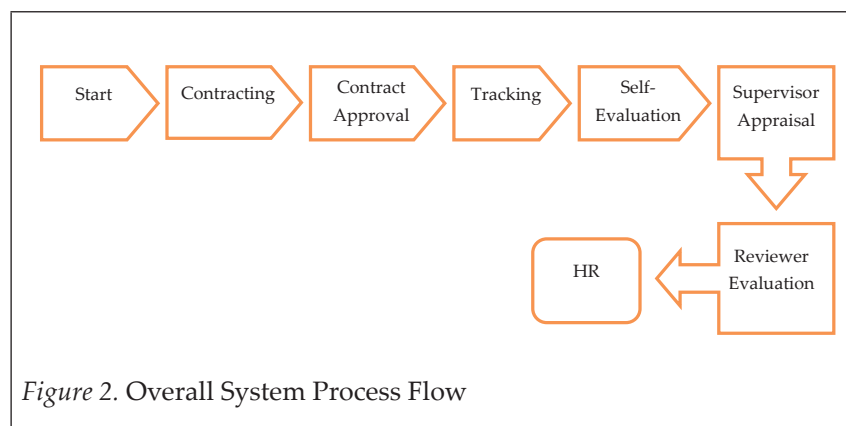


Figure 2. Overall System Process Flow

## System Development Methodology

The IT Division has developed a process which is in line with the ISO documentation. All the documents need to be agreed and signed by the system owners before the IS team can start any IS development project. Due to this, a traditional waterfall methodology is being adopted. Studies have shown that despite its rigidity, the methodology is still being used by many organisations (BinSaleh & Hassan, 2011). This is imperative because users often change their requirements, which will eventually disrupt the system development lifecycle and overrun the overall project completion date. Additionally, the IS team can also allocate its resources effectively in order to develop the desired system within the timeframe. Table 2 presents the system development lifecycle being used to develop the KPIS-NE. Each stage must be completed and endorsed before proceeding to the next stage.

Table 2

### *System development lifecycle at TM*

Item	Action
Business Requirement Specification	System Owner
Planning	IS Team
Functional Requirement Specification	
System Design Specification	
System Requirement Specification	
Development	IS Team
Infrastructure Setup	
Coding	
Testing	IS Team / System Owner
User Acceptance Test 1	
Bugs Fixing	
User Acceptance Test 2 (if needed)	
Bugs Fixing (if needed)	
Deployment / Implementation	IS Team / System Owner
System Migration	
Data Migration	
Training	System Owner / Users
Maintenance	IS Team

## **IMPACT OF THE KPI SYSTEM**

### **Impact of System on System Owner**

The system has a massive impact on the system owner or the HR team. The system, which is perceived by several staff of HR as being very user friendly and fast, allows easy retrieval of performance appraisal information for all NS staff. It also helps in terms of productivity where HR teams can easily get full information about staff performance targets, activities, and achievements. The records are then used for promotion, bonus entitlements, and for giving incentives to the deserving staff. The training needs of each team are also recorded, thus helping their supervisors and HR to plan training courses for every employee. Implementing the system certainly promotes transparency performance evaluation. Each member of staff is given scores or rankings by their supervisors and their higher managers. This exercise increases the morale of staff and eventually also their productivity.

In addition, employees now know the overall targets of their respective section or divisions. They can relate their job tasks to the performance of their division and build team spirit within their division. In the past, with the manual process, employees felt more isolated and could not connect well with each other in their team in working towards achieving the divisional KPI targets. From the interview, they now know the divisional balance score card, key performance indicator, measurements, and targets.

The success of KPIS-NE can also be viewed in the context of the system's effectiveness and efficiency which give a lot of benefit to NS. Effectiveness and efficiency are normally used to measure the usability and success of a particular system (Hassan & Li, 2005). The system is described as very effective in the sense that it has met the main aim of the system, which is to automate the KPI assessment of non-executive personnel. The system is also found to be fully functional and usable to the users. As for the system's efficiency, NS can now save a lot of money and human effort as KPIS-NE allows employees' KPIs to be assessed faster and in a more transparent manner.

### **Impact of System on Users and Employees**

As far as the users are concerned, they want an easy system which has easy navigation, a fast response and a good search capability. These are in fact the basics of a usable system which would partly determine

the success of a particular system (Hassan & Li, 2005; Nielsen, 1993). All participants agreed that KPIS-NE has been able to fulfill these basic requirements. Furthermore, the system is a web-based application and therefore users do not have to install any software to get access to it. It is also accessible anywhere and anytime with a secure username and password. The system is also compatible with any web browser preferred by the users. The most important factor is system performance in term of system response and the ability to display the desired results accurately and quickly. Using the search function, for example, the system allows users to quickly get access to the required information.

As mentioned before, users are able to find their current scores and levels of performance. Their supervisors are also able to retrieve information about their supervisees' performance targets and achievements, and their social and sports activities outside of job specifications. This enables the staff to highlight their overall contributions to their respective supervisors, apart from their normal job routines and requirements. There were cases in the past when employees who were stationed in remote places failed to get high performance appraisal scores as compared to those working at the Headquarters. One of the reasons was that it is very difficult for their supervisors to get full information about the activities of their subordinates, which affected the performance appraisals. With KPIS-NE, this setback can be reduced, if not eliminated. The system helps avoid favoritism and bias in the performance appraisal process. Employees felt more appreciated and willing to work even harder to achieve a good outcome. Therefore it can help NS increase productivity and achieve business goals. From the interviews, it can clearly be seen that most staff are happy and certainly satisfied with the introduction of the system.

### **CHALLENGES IN IMPLEMENTING THE KPI SYSTEM**

Although we are now living in the IT era, IT illiteracy in organizations still exists. NS is also facing this problem due to age, education, and the nature of relevant job factors. NS employees are located all over Malaysia and some do not even have email accounts. Those staying in the city are much easier to train but those living in the rural part of Malaysia will have bigger issues of concern. The illiteracy issue should not be underestimated, especially in the context of large organizations such as NS. It could certainly hinder the smooth implementation of any IS within an organization.

Also, the huge number of NS personnel logging into the system on concurrent basis is also affecting the performance of the servers and the network connectivity. This could, to a certain extent, have an impact on the implementation of the KPI system.

Another critical point to be highlighted is that this system is a seasonal application. Employees only have to access the system early in the year during the contracting process or setting up the target for a particular year. The other time they will be accessing the system is at the end of the year, to record whether they have achieved the target which they have set earlier. The system will be in full capacity during those periods but for the rest of the year, it will be relatively idle.

All these challenges are taken into consideration seriously by the implementation team. Proper strategies are employed to ensure the success of the KPIS-NE's implementation process, which will be explained in the next section.

### **Strategies for Implementing the KPI System**

The HR team and the IS team have setup a number of strategies to ensure the smooth process of implementing the KPI system. Firstly they implemented the system only for the state of Sarawak, as a pilot project. As employees here are located all over the state, this is a good avenue to ascertain how the KPI system training can be planned and executed effectively. The system performance can also be tested as the server is located at the Data Centre in peninsular Malaysia. Managers and supervisors, especially the executives already have experience of using the KPI system. The new KPI system for non-executives (i.e. KPIS-NE) is almost identical in term of functionality to the KPI system for executives. Henceforth, supervisors can assist HR in training their subordinates to smooth out the training process. The IT illiteracy issue is also taken into consideration in the training process.

As far as the servers are concerned, they are installed in two separate partitions inside the VMWare big machine. During the high season, a VMWare administrator can allocate more CPU and memory capability to the system. During the off season, they can set the system to a low capability. This can help to avoid the wasteful use of resources during the off peak season and increase the productivity of others systems. Moreover, money can be saved from buying a new high-end hardware and license for a Windows Server.

## **FUTURE PLAN FOR INFORMATION TECHNOLOGY AND INFORMATION SYSTEMS**

From the IS point of view, the performance or response time of the system should be improved. As new technology emerges from hardware to software, the IS must be able to keep up with the technology. Currently KPIS-NE is accessible using a personal computer or a notebook. In the future it should be able to support mobile devices such as smart phones and tablets. Server partitioning can also be increased as well in order to support high loads during the peak season.

Some respondents in this study have proposed a system to use statistical modeling to determine the best result. Some of them have commented that their performances are not being fairly evaluated and wish that the salary increment is not related to the KPI. Issues like this are not related directly to the IS, but are partly due to human nature (e.g. subjective assessments of certain performance criteria) and as such the HR team should think about how to address this. The System is just a tool to keep track of all the KPIs of employees and at the end of the day, their supervisors or superiors will be responsible for assessing their performances. System training must be provided accordingly via instructor based, or even e-learning type, training. The NS training center has developed an online training system and users from rural areas can learn the system electronically to save the costs of travelling and lodging.

From the feedback, starting from 2013, all employees have the ability to assess and score their superiors' performance in terms of behavioral factors such as leadership, communication and good motivation. This approach improves the overall performance process for every employee, regardless of their position within the organization.

## **CONCLUSION**

NS has employed state-of-the-art system architecture with high speed network, security policy, data storage capability, and robust enterprise applications. Most of the functions are supported by enterprise software such as SAP, Oracle and Microsoft. With these outstanding examples of infrastructure and technology, NS is able to develop and implement IS efficiently in a way that includes the KPI system – KPIS-NE. KPIS-NE is a supporting system that assists employees in recording and monitoring their KPIs every year. It is a web-based system which has proven to have a great impact to both non-executive and executive staff. The system is

perceived by both system owners and users to be very user friendly, reliable, fast, and efficient. Because of the seasonal nature of the system and issues such as IT illiteracy among some NS staff and the heavy volume of users, the HR team needs an effective strategy to implement the system smoothly and successfully. Nonetheless, KPIS-NE provides a good example of a transparent system which managed to win the hearts of employees when it was pilot tested. Despite some challenges during and after implementation, KPIS-NE has the potential to motivate staff to work harder to meet their KPIs and help NS achieve its goals.

In the future, many other functions can be introduced into the system. As employees become more familiar with the system, enhancements can be frequently made on regular basis. The system should also be made accessible to devices such as smart phones and tablet PCs. NS should also effectively maintain and upgrade the IT infrastructure to ensure the successful implementation of all IS within the company.

The outcome of this case study supports previous findings and relevant IS theories such as DeLeon and McLean's IS success model (2003). The IS success factors of system quality and information quality have proven to be very important in the implementation of KPIS-NE. Other factors including user satisfaction and net benefits are equally important in the context of this study. Nonetheless, the remaining factors such as service quality and intention to use have not been investigated and thus require further investigation.

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## NOTE

The name of the company in this case study was changed due to security factor. Some of the sensitive information was also removed or revised. Nonetheless, the presented case is based on an actual system which was implemented successfully in the company.

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