The Research of Critical Success Factors for Performance-oriented Electronic Support Systems - Resource-Based View

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Abstract—**Intensive competition has driven enterprise to look for more effective methods to increase performance. The Electronic Performance Support System (EPSS) has been proposed to provide instant performance whenever and wherever needed. However, due to its difference to traditional e-learning mindset, the adoption and design of EPSS is still at the early stage. This research aims to find the critical success factors of EPSS adoption through Resource-Based View (RBV). Six companies that adopted EPSS were interviewed and the success factors were identified. The results show that organizational needs, knowledge management and renewal, training materials and top management support are among the most cited factors for success. Finally, specific recommendations for companies in different adoption phases are given for better success rate.**

Keywords- electronic performance support system (EPSS); performance support (PS); performance centered design (PCD); resource-based view (RBV); critical success factor (CSF).

I. INTRODUCTION

With the advancement of the current market, the importance of human resource and its productivity can not be over emphasized. Business owners, human resource development specialists, and information technology professionals are putting their best efforts to enhance the competence and performance of modern workers. However, traditional training and developing concepts still focus on making "teaching" and "learning" more effective, even though this may take a longer time and the transfer from learning to workplace may not always be efficient, requiring numerous repetitions and a lot of practice.

The idea of Performance Support System (PSS) aims at solving this very issue. It improves workers' behavior, then their performance, by providing the needed instruction and information at the right place and the right time. Ideal performance support is to provide workers mandatory information or instruction whenever and wherever needed, without the workers having to memorize numerous rarely-used data or processes. It can also shorten the training period, as workers can get immediate support after taking their positions.

Gangano [33] stressed the necessity to align the learning activity with the performance. Many professionals have claimed Electronic PSS (EPSS) can effectively improve individual's efficacy and organization's competing ability. Many real world cases have also demonstrated how the performance support system integrates various resources and helps employees fulfill job requirements. [13][21][30]

EPSS has served as software a tool to help workers complete their jobs even before the millennial [27]. With the rise of the Internet, it has become natural to use networks as media to deliver training. However, with the fast changing pace and the increasing competition, modern workers need faster and more precise information to help them handle the tasks. Since these tasks and the circumstances might change from time to time, the need for a fast transformation from various customer demands and complicated knowledge to a satisfactory result is growing quickly. As a result, the development of PSS has regained attention and a performance centered design methodology is also being emphasized.

Along with the advancement of wireless and networking technology, Mobile Performance Support System (MPSS) extends the applicable circumstance without being limited to a workstation, like traditional EPSS. The increment of bandwidth allows more data to be transmitted simultaneously, which makes the support and simulation more vivid to reduce the transfer gap between knowing and doing.

The progress of technology and the need to catch up with the market demand both trigger the ongoing interests of PSS. On the other hand, the obvious different approach from

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traditional instruction design --- learner-centered or instructor-centered --- to performance-centered design not only constrains the available resources from the market, but also requires a paradigm shift for the professionals involved in the field.

This paper is structured as follows. In Section II, the earlier research results about the definition and utilization of Critical Success Factor (CSF) along with the evolving of electronic PSS are presented to set the foundation of the importance of this research. The research method, including the background of interviewees and the categorized interview content, are presented in Section III. The reflection on the six cases presented and the suggestion for application are discussed in Section IV. The conclusion is in Section V.

II. LITERATURE REVIEW

A. Critical Success Factor

In order to help organizations adopt the new tool and widely utilize it so that efficiency can be increased, fulfillment of the critical factors for successful adoption are needed. Critical success factors are the items that have positive effects on the operation while also increasing the competing ability for the company. Critical success factors vary under different circumstances.

The idea dates back to Commons' "Limited Factor" [9] which applies it on management and negotiation. Barnard [3] adopted the idea and stated "Strategic Factors", which are factors people are looking for when making an analysis during decision processes. Daniel [10] considered "Success Factors" as elements filtered by three to six critical criteria that vary from domain to domain. These elements are influential to the success or failure of the industry and companies need to put more resources on such impactful areas. The optimization of the above elements can make companies more successful.

Leslie and Richard [18] proposed eight critical success factors for the adoption of information technology. Imtiaz et al. [16] summarized 15 factors by reviewing articles from 1999 to 2012. Upon the research, they hypothesized 7 factors such as: Top Management Support, Leadership, Clear Goals, Team Capability, Effective Communication, Customer/User Involvement, and Adequate Requirement have a strong effect on the success of IT (Information Technology) projects.

B. Resource-based View

To better link the critical success factors for performance support system and the assessment of readiness for enterprises, we utilized Resource-based View (RBV) to analyze the factors. RBV refers to the fact that competitive advantages of a firm lie primarily in the application of a bundle of valuable, tangible or intangible resources at the firm's disposal [23][26][29]. Barney [4] re-categorized resources from the viewpoints of owned or held by organizations. He then labeled Physical Capital Resources, Human Capital Resources, and Organizational Capital Resources. A subsequent distinction made by Amit and Schoemaker [2] was that the encompassing construct previously called "resources" could be divided into resources and capabilities. In this respect, resources were tradable and non-specific to the firm, while capabilities were firm-specific and used to engage the resources within the firm. Such implicit processes were used to transfer knowledge within the firm [15][19].

Wu [31] suggested resources should be categorized as tangible capital and intangible capital which can be measured by a dollarized value, while capabilities can be categorized as organizational capability and individual capability, which help organizations become more competitive by better proceeding resources. Bharadwaj [6] considered IT as an organizational capability and classified as IT infrastructure, human IT resources, and IT-enabled intangibles. He also found firms with high IT capability tend to outperform the firms with low IT capability.

C. EPSS

The operation of business rates effectiveness and efficiency highly. It is no surprise the call for "learning when working" and "just in time support" is vastly required by managers. Business owners and managers always want to put their resources on the most rewarding area, which reflects the earlier development of EPSS than E-Learning [27].

Gery [13] proposed EPSS as an integrated electronic environment available to each employee. It was structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others. Raybould [34] gave a shorter definition: a computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning experiences. Bezanson [5] provided a definition linked to the application usability and organizational results: A performance support system provides just-in-time, just enough training, information, tools, and help for users of a product or work environment, to enable optimum performance by those users when and where needed, thereby also enhancing the performance of the overall business.

EPSS shifts the idea of worker as "people who accept training" to "people who need support when doing their jobs". It centers on the tasks on hand. EPSS responds to questions and requirements when workers are facing new or complicated situations. A well-designed EPSS can provide on-time support such as suggestions and aids, blend supports within the environment, and utilizes technology when needed [7].

Raybould [25] further suggested EPSS should support all aspects that might affect workers' productivity among the whole production process and embed knowledge seamlessly. He considered EPSS as an Electronic infrastructure that can obtain, store, and distribute knowledge capital between the organization and the individual so workers can achieve the desired performance level within the shortest period with the lowest level of other people's support. The top five perceived benefits of EPSS are: decreased information overload and paper documentation, reduced training time, increased

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productivity, improved job performance, and enhanced employee empowerment [8]. Chang [8] claimed it reduced external support by 80% and saved half of the training time.

With the huge progress of wireless and networking technology, the flexibility of data transmission today is far beyond the imagination of the nineties. The advantages of adopting mobile technology include flexibility, speed, and more efficient networking, which allow access to large numbers of staff throughout the world and a more efficient working environment, with less manual paperwork – work can be done faster, more flexibly, and with greater levels of accessibility. Even more important are more efficient training, saving time to inform staff about new products and processes and saving of time and money [24].

Ahmad and Orton [1] considered MPSS has high potential to improve performance, especially for the works in isolated time and location. To ensure MPSS is being optimized for the workplace performance, contextual knowledge is mandatory regarding the ease-to-use and the design. MPSS is the combination of communication device and EPSS [28]. It utilizes mobile devices and applications to facilitate the performance of the job. Tamez [28] proposed the model of mobile phones as performance support systems (Figure 1).

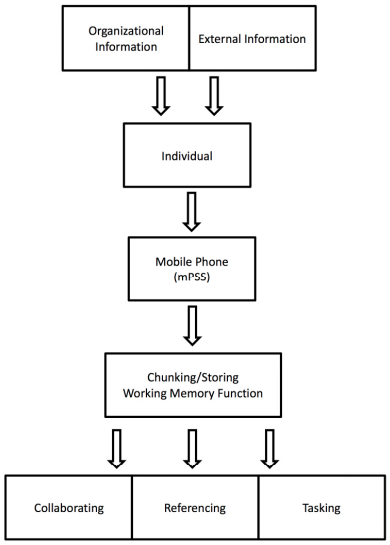

Figure 1. Model of mobile phones as performance support systems [28]

D. Comparison between EPSS and E-Learning

E-Learning and blended learning have already been well-known and widely adopted methods to train and develop workers. However, most 'learning' activities require workers to be away from their work, which not only reduces their time on the job, but also increases the difficulty for workers to apply their learning, because of the difference of circumstances and the delay of time from learning to application [22]. Accordingly, more emphasis is put on support performance and learning at the workplace. This approach not only allows workers to work and learn at the same time without being limited by time and space, but also learning at the real working environment and under the needed situation to achieve the optimal result.

Gottfredson and Mosher [14] stated that, in order to make a learning system more complete, it was inevitable to include PS, since "appliance" was the most important issue among the five learning needs. Although PS had its training possibility, its biggest value resided in solving professional problems and not in education [12].

The idea of designing EPSS comes from Performance Centered Design (PCD). With PCD in mind, the user interface is structured to execute job assignments and the activities should also focus on optimizing possible performances by considering the context and assignments. Empirical results showed that using PCD for advanced technology training can be more effective at preparing learners with self-oriented learning and improve or adapt the varying working environment than traditional classroom training [17]. Yu and Yen [32] stated the specialty of PS was to let workers learn the exact amount rather than a lot, at the exact time rather than early.

To achieve this desired result, McGraw [20] proposed the process of PCD: (1) Identify Requirements, (2) Analyze Requirements and Reengineered Process, (3) Develop Visual Prototype of Key Functions/Screens, (4) Conduct Formative Usability Evaluation, (5) Refine Requirements, (6) Design User Interface Screens, (7) Develop User Interface Screens, (8) Conduct Summative Usability Evaluation.

The central focus should include: User Characteristics, Cognitive Needs, Performance Needs, Performance problems, Training Issues, System Functionality, and Attitudes [20].

There have already been several cases utilizing EPSS in the western world which brought sound results. The application situation varies from healthcare usage to fast food chains. The purpose of it can also be very different, from coast security to car manufacturing. However, the application is still not too widely explored in Asia. To retrieve the critical success factors, further research should be conducted.

III. RESEARCH METHOD

We chose semi-structured interviews to understand the strategy used by case companies as well as their consideration to extract the possible success factors for adopting EPSS. This method provides a framework of data collection and also gives the possibility to reveal more in-depth information. The interview guide is designed based on RBV and earlier researches to cover the resource and ability required to successfully adopt EPSS within the organization. The interview is recorded with the permission of the interviewee and the transcript is reviewed with the original interviewee to ensure correctness. The approved transcript is then coded for categorization and analyses.

Six case companies were interviewed in this research. As we looked for the successfully adopted cases, only the companies with EPSS in place for more than one year are considered. Since EPSS is not a common tool used yet, the cases are chosen by snow-bowling. To really extract the success factors of EPSS, the decision maker or the

professionals who are highly connected to the adoption/usage of EPSS are interviewed. Shown in Table I below are the backgrounds of the case companies and interviewees.

TABLE I. BASIC INFORMATION OF CASE COMPANIES AND INTERVIEWEES

Basic Information	Company Symbol					
	A	*B*	*C*	*D*	*E*	*F*
Industry	E-learning system	OEM of IT product	Information Service	Human Resource Service	OEM of IT/Telecom product	Digital Contents
Fouding time	2000	1984	1979	1997	2001	2000
EPSS adoption years	2 years	6 years	5 years	16 years	7 years	2 years
Title of interview-ee	Manager	Senior Director	Group Leader	Consultant	OD and HR System Manager	General Manger
Deprtment of interviewee	Sales and Marketing	Research Engineering	Training and Development	Consulting	Human Resource	General Manager's Office
Gender	Male	Female	Male	Male	Male	Male
Seniori-ty	3 years	11 years	11 years	1 year	9 years	14 years

A. Analysis

We categorize the transcripts into four constructs: tangible assets, intangible assets, individual capability and organizational capability. The constructs and the coding are listed below in Table II.

TABLE II. CODING TABLE OF CSF OF EPSS

Constructs	Axial Coding	Optional Coding
Tangible Assets	A01 IT Infrastructure	A0101 Organizational Needs
		A0102 Individual Mobile Device Needs
	A02 Quality of IT System	A0201 Easy-to-use
		A0202 IT Security
Intangible Assests	B01 Knowledge Assets	B0101 Need Assessment and Planning
		B0102 Knowledge Management and Renewal
Individual Capability	C01 Promotion and Training	C0101 Seminars
		C0102 Training Materials
	C02 Willingness and Motivation	C0201 Communication
		C0202 Compensation
Organizational Capability	D01 Change Management	D0101 Culture and Environment
		D0102 Top Management Support

1) Tangible Assets Construct: This construct is set to evaluate the effect of tangible assets owned by the organization on the adoption of EPSS. We can further label them into two categories: IT Infrastructure and Quality of IT System. These tangible assets include hardware and software such as Internet structure, system platform, device and carriers. Networking technology, cooperation between hardware and software, quality of the system and IT security all affect the success or failure of the adoption.

a) IT Infrastructure (A01): Whether the infrastructure provided by the organization can pass the minimum requirement and whether the device used by the individual is suitable will affect the ease to get online and reduce the barrier to support users.

- Organizational Needs (A0101): Most interviewees considered having networking environment, servers, and personal computers as basic requirements to support the adoption of EPSS.
  'A server is needed for sure, if there is no server, then there must be a self-built or cloud server in place. There must be databases and relating servers as well. People can then access relevant learning materials.'(S01-03-10)
  'IT infrastructure needs to be provided such as computers, networks, servers, and application softwares'(S02-02-09)
  'Networks, softwares, and infrastructures need to be provided'(S03-02-08)
  'I reviewed the system requirement and it is not too hard to achieve. Basically a server is still needed.'(S04-03-09)
  'The basic computers, databases, and server network are "musts". With the basis of the hardware, all personal data must be loaded onto the system so the rights of people can be changed accordingly.'(S05-03-06)
- Individual Mobile Device Needs (A0102): With the advanced of wireless technology, many interviewees also mentioned that the adoption of mobile devices is more and more popular.
  Because our company emphasize the potential of mobile technology, we wish there were some wireless network device or the normal users can own something like laptops, pads, or smartphones to allow them to connect to the net as well.'(S01-03-12)
  'Every member of the staff has a PC and a workstation according to their job nature, so they can access the network anytime they want.' (S02-02-09)
  'Laptops, tablets, and even cell phones should always work since you should be able to use it no matter where and when' (S03-02-08)
  'Since it is basically operated under a PC, as long as you have PC, you are able to log in and operate.' (S04-03-10)
  'I think those sales persons cannot even work without tablets. In addition, if it is not connected to the network, it is as if the device is not functioning . That's why all the sales persons are equipped with network connecting tablets' (S06-05-09)

b) Quality of IT system (A02): The design of the system should consider user's needs and also the security of enterprise IT system. A well-designed system can reduce the learning curve while also preventing major risks of the enterprise IT system.

- Easy-to-use (A0201): Most interviewees mentioned, the user interface should consider the factors of easy-to-operate and easy-to-understand, so users can quickly understand and achieve expected goals.
  'When dealing with a more complicated case, the sales team and customer support team can have timely support from the system. It is like having an expert system.' (S01-02-05)
  'We need to make them feel the developers really knew the demands and are great help.' (S02-04-19)
  'Need to fill the job needs of users which can really help users during their design times. Need to be sensitive to needs, … Need to have passion to serve.' (S02-04-17)
  'Easy-to-use and also the user's habit should be considered. How to make people develop such habit is also quite important.' (S04-05-19)
  'I think if we consider mere local office, the biggest issue might be in language as the system is mainly displayed in English which brings more difficulties to us.' (S04-05-18)
  '(When filling out system requirement form,) sometimes the coordinator only cares about whether the form is completely filled while IT people only care about whether I completed all the specs required by the user. However, this system will be used under different kinds of circumstances. Whether these possibilities and twists are considered or not is a big issue.' (S05-09-19)
  'It needs to be an easy-to-use system. Easy-to-use means, the function and usability fits the needs of their company. You should not develop something of non-value.' (S06-06-11)
- IT security (A0202): Some interviewees considered management of access rights and the control of IT security are both important topics need to be paid attention to.
  'We operate under flexible hours and the employees can connect back to the office through VPN. That's why IT security is a must for us.' (S02-02-09)
  'We need to consider IT security when using the system to help on assignments' (S03-02-08)
  'Talking about security, we will regulate different rights according to different purposes and requirements. Take PS as an example, all of our company's platform can let employees log in with their employee ID. The HR system manager has additional ID so he can use another identity to manage the system.' (S05-04-07)
  'That system has its own password. In our company, each different system requires control and certificate whenever people try to log in.' (S05-04-08)
  'I think, in order to make EPSS valuable, it must be connected to the network, be it intranet or internet. However, if the network is connected, it is unavoidable to have security issues. This is always a challenge to a big company and people will likely stick with intranet only.' (S06-02-03)

2) Intangible Assets Construct: This construct refers to how the intangible assets owned by an organization affect the implementation of EPSS. The knowledge base itself, the updates of the content and knowledge management and integration can all influence the success rate of the system. The relating transcripts are listed below:

a) Knowledge Assets (B01): There must be a fit between the task and the aid provided to make the system really helpful. The integration of knowledge management and the construction of knowledge database can also help others maximize the benefits of knowledge.

- Need for Assessment and Planning (B0101): Most interviewees stated that it is necessary to analyze the goal of users to provide information that fits the circumstance and really have the links with users. Only through the value of the system is maximized.
  'The key learning needs for the new sales person is on how to get new accounts. If we can provide new information about our product and also the knowledge of the competitor (through the system), then the sales can utilize the more up-to-date information.' (S01-01-04)
  'Each department needs different things. Since they have different requirements, thus they need different tools for each of them. The system used here will not be provided to all other units.' (S02-02-07)
  'Needs analysis is mandatory when adopting a system. During needs analysis, different processes will be analyzed. (For instance,) if the system is for the use of HR, then the process of HR is analyzed.' (S05-06-13)
  'The idea is, when the employee has some questions, then he or she does not need to ask anyone but can get the correct answer from the system.' (S06-02-01)
- Knowledge Management and Renewal (B0102): Most interviewees mentioned the company will reorganize data into useful information along with the evolving of time, so the system users can obtain a more suitable knowledge.
  'We will update the system through time. We usually check every six months to see if it is necessary to update.' (S02-02-10)
  'We will review the content and take out the outdated material and purchase new material that fits our current needs.' (S03-03-09)
  'The reference materials, such as system databases will be updated whenever there is a need. I think it will be updated for sure. I am just not certain how often.' (S03-03-10)
  'We update the system regularly ever since it was developed.' (S04-02-06)
  'In the beginning we set up only one universal database for all managers. Since 2007, we began setting up new management competence for different management levels, which meant we changed and improved the system by the requirement of the company.' (S05-05-08)
  'If it is not updated , then I bet it will soon be forgotten like an unmaintained website. As a result, I always think the best chance resides in a mobile solution, as it is portable and can trigger more interests to update. I think only the combination of mobile devices, content of

mobile spirit and structure of wiki can construct a continuous updated EPSS. If a company can do this, this will be a great help to that company.' (S06-03-04)

3) Individual Capability Construct: This construct refers to the human resource and capability of the organization to the effect of successful adoption of EPSS. The perception of people and how enterprises help people to use the system to obtain the required skill and ability are all related. These include the seminar of system being placed, training materials for users, surveys and feedback collection from users.

a) Promotion and Training (C01): Proper training and promotion can increase familiarity of employees with the new system, reduce trial and error so users can smoothly use the system to help their job.

- Seminars (C0101): When using systems from vendors, seminars can make employees better understand the idea and relating policy about the new system.
  'We are sales people. Not only do we use this system but also sell this system. As a result, we got an idea of how this works when we took product training.' (S01-04-18)
  'For the customer, we still need to tell them how this system works to make it easy for them.' (S01-04-19)
  'The vendor will host seminars to demonstrate how to use this system prior to implementation' (S03-03-13)
  'There will be a public announcement when the system is put online. Afterwards, we will set mandatory classes for different groups of people according to the different fields of each system' (S05-07-14)
- Training Materials (C0102): For global companies, using digital training materials can help employees get used to the new system without being limited by time and space.
  'It all depends on the complexity of the system. If it is quite complicated, then there will be training sessions. However, if the system is not that complicated, a handbook or SOP will be enough. Besides, we have all those on-line as well.' (S02-03-13)
  'We will host seminars and aid with some relating documents. Vendors will prepare their presentation and email to us.' (S03-04-15)
  'Relating introduction and demo, it can be found within the intranet.' (S04-04-15)
  'We will try to put some idea of SOP inside the system. There will be explanations on how to use the system within the system itself. Users can then check the use of different function when they want to.' (S05-07-15)

b) Willingness and Motivation (C02): The employee is one of the most valuable assets of an organization. Performance of employees is key to the competitively of a firm. An implementation strategy and optimization system that adjust according to the feedback from users can help increase willingness to use the system while, suitable compensation can boost motivation even further.

- Communication (C0201): Interviewees responded that user feedbacks are critical factors that drive system adjustment. Regular communication and collecting feedbacks can make the system even better.
  'Not only do we listen to employees, but also to customers and adjust our system accordingly.' (S01-04-15)
  'We do user survey every six month.' (S02-03-11)
  'Our survey aims at department and not just at the managers. All levels are welcome.' (S02-03-12)
  'We will regularly ask, at least once a year, about the satisfaction with the system.' (S03-03-11)
  'When purchasing a new system, we will go back and ask which should be preserved and which should be thrown away.' (S03-03-12)
  'I know they will adjust the system and have a certain way to measure it.' (S04-04-14)
  'All of our systems have a service window. For instance, there is (the contact window's) information within the system. If you have any opinion about the system, you can contact the corresponding person and all feedback from user will be taken into consideration.' (S05-05-10)
  'We will consider the impact and priority first, then we arrange time for the modification.' (S05-05-11)
  'The feature of the mobile world is "fast", so you cannot put a system there and never change a thing forever. For instance, one of our customer's systems has new material every week. When there are needs for adjustment, one perspective is from the management view and the other is from the survey, looking at what the sales person's needs as what they can do for the next stage, no matter the function or the content.' (S06-03-05)
- Compensation (C0202): Most interviewed companies used and consider it is a more effective way to compensate rather than to punish employees to motivate them to adopt the new system.
  'We used compensation to encourage employees using the system and the effect is not too bad.' (S04-04-17)
  'The culture of our company is open policy: If the system is not used by someone, we will not force him/her nor punish him/her.' (S02-04-16)
  'We will use event or reward gift to motivate employees and we don't have any punishment policy. However, there are something an employee has to do otherwise he or she will not be able to do his/her job properly.' (S03-04-19)
  'From our own experience, if there is no special incentive, then the utilization rate will be lower. Unless this system fits perfectly with the users need when designing, then there is no need for special promotion.' (S06-05-09)
  'We need to encourage content generation and the use of the contents. In the end, if there is content but no one is using it, the content will simply be a waste. That's why I think knowledge management was in the situation of no user. This situation is improved with wiki. As a result, I think it is important to include a broad encouraging initiative so we can have the content coming out continuously.' (S06-05-08)

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4) Organizational Capability Construct: This construct refers to the effect on change management within the organization to the adoption of EPSS. We discussed the influence from operation, organizational environment and degree of digitalization. Factors including supervisor support, management ideas, and organization culture all affect the success rate of a system.

a) Change Management (D01)

- Culture and Environment (D0101): The interviewed companies usually face change with an open attitude, while not forcing employees to follow.
  'The company is not a forceful entity that is driven by the boss. I think it is because of the differences between cultures. There is no special mechanism. If someone thinks something is needed to be done then just go ahead and do it. If there is something that needs to be fixed, then just have it fixed.' (S02-04-15)
  'There are some systems that, if you don't use them, you are not able to complete your job properly. As a result, you must go consult someone and learn.' (S03-04-18)
  'Since our company belongs to Hi-Tech industry, we are highly digitalized. There is no need for special training about how to use computer and we can figure it out pretty much by just looking at it.' (S03-04-15)
  'To make it a habit, you internalize it.' (S03-05-22)
- Top Management Support (D0102): Interviewees think the supportive gesture taken by high level managers can help promote overly and change the atmosphere of the company.
  'This is the policy of our company, since we are going to sell this as well. It is a decision from the boss himself, thus his support is a really big driver for this.' (S01-04-17)
  'Top managers surely communicated with the directors and managers of my department already. We need to have top management support to continue on this.' (S03-04-14)
  'Emphasize from top management level is the most critical factor. He or she needs to personally link to your projects.' (S03-05-20)
  'They are totally supportive of the decision of the company. However, the support might come in a different size and shape. One of the most common ways is he will tell us what might make the system even better.' (S05-07-16)
  'The support from top management is surely important. If there is no command from the top management, normally no one will care for this thing.' (S06-04-06)

These CSFs are summarized according to the response of case companies. As we can see by the numbers of being mentioned: all six companies view IT infrastructure a must and all data need to be able to be accessed through networks. In addition, the management and especially the updates of the knowledge content are also important for all responders.

Almost all companies reported training materials and top management support are critical to the success of the adoption of EPSS. While seminars, communication, need for assessment and planning, and individual mobile device needs follow on the most counted list.

IV. Discussion and Conclusion

With RBV, a framework to analyze the CSFs of enterprise adopting EPSS is proposed. Out of the four constructs, "Intangible Assets" is considered the most critical one by the average counting of its items. All six companies highlight the belonging factor "Knowledge Management and Renewal". This coincides with the trend of modern "Knowledge Economy Era". In this era, the creation and storage of knowledge and skill is crucial. This critical asset can create wealth of individual to nation as well as drive economy activity. Knowledge becomes a strategic resource of enterprises and its management is important. All innovation relies heavily on knowledge, thus the content of the platform must be rich and relative to facilitate users to obtain suitable information and access to relating knowledge. Employees can then handle their own task and extend their professions at the same time. As a result, the efficiency of a person is increased and, in sum, the organization's performance is also increased.

Since EPSS is the system that helps workers when they are in need, the system itself needs to be kept up-to-date at least to the status-quo to be effective. "Need Assessment and Planning" is also an important factor under that construct as the system needs to really solve the problems of users. This will also affect the willingness and the culture, as one of the most obvious cases is a person might not even work well without the help of the system, such as transcript S03-04-18.

On the other hand, the axial "IT Infrastructure" under the construct "Tangible Assets" is also critical based on the response of the interviewees. The proper setup of server and network is the foundation, while suitable mobile flexibility should be provided to employees. The mention of server and networking in "Organizational Needs" does not bring too much information to us as most companies have the infrastructure in place, be it self-constructed or hosted by vendors. On the other hand, whether mobile network can be accessed and utilized truly depends on the policy and strategy of the company. Some companies even provide mobile devices intentionally to help their employees.

The axial "Quality of IT System" was mentioned by fifty percent of the interviewees. Although both Easy-to-use and IT security are important issues, the influence from them seems to be moderate compared to the other factors. This might be because these factors are less relative to a specific system, but rather an integration of consideration of a whole.

From the aspect of "Capability", interviewees mentioned the axial "Promotion and Training" most frequently. Both "Seminars" and "Training Materials" are referred to as CSFs by more than 60% interviewees. This reminds us although EPSS system tries to reduce the workers' down time due to the necessity for off-site training, it is still unavoidable to employ mandatory opportunities. However, one must be very careful when designing the course and system as this extra learning due to the additional system should not reduce the productivity of employees when considering all the pros and cons. If the system builds in itself self-guided or clear

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instruction, then this could reduce the needed time and effort to utilize the system.

While "Seminars" and "Training Materials" both have an effect on communication between providers and users, the factor "Communication" covers more aspects than that. To make the system best serve the employees, feedbacks from employees should also be considered. To collect feedback from users for the regular modification or purchase of the new system is a common practice among the interviewees.

An organization that does well on both side communications can make known the purpose and benefits of the change, while also collecting opinions from the field more quickly. Elving [11] stated, "Communication is vital to the effective implementation of organizational change" and the adoption of a new system is certainly one kind of change. Prior to the introduction of the system, it is better to consider the communication policies and programs to achieve the best result.

Last but not least, the support from top management is also vastly mentioned within the survey. The support can help on various aspects, such as monitoring the progress and motivating the involvement of employees. If there is a communication problem among different departments or internal communities, the help from top management can also facilitate the discussion and agreement among groups.

Most companies responded that they took a step-by-step approach such that, once the adoption project gains the approval from managers, a small group will first adopt as trial. Once the benefits of the system emerge, the necessity for the vast promotion will decrease significantly while other departments would eager to adopt the system as well.

To recommend companies to successfully adopt EPSS in the future, we propose the following suggestions:

1) Companies considering but not yet adopting EPSS:

- Draft proposal: Evaluate the needs of the organization and compare the status quo of the company to the CSFs. If the benefit is better than the effort, construct the proposal in an easy to understand way and gain the support from top management.
- Search for external support: Project team should consult other companies who already adopted the system to learn from their experience and current situation. It can also try the vendors system for further evaluation about the cost and benefit of in-house development or external procurement.

2) Companies just adopted EPSS:

- Focus area of the project team: The project team needs to ensure it has sufficient representatives from key departments such as IT, HR, and top managers. The project team can then evaluate which will be the quickest area for rewards and focus on realizing the benefit.
- Complete promotion and reward: The communication for the users and managers should be considered and well-prepared for better integration between them. Proper reward can boost awareness and motivate the early adopters.

3) Companies using EPSS:

- Management of knowledge assets: A continuous improvement mechanism needs to be put in place and executed so that not only the users feel that the information is beneficial and helpful today but also increase the habit to look it up when difficulties arise.
- Follow-up of the usage and effect of the system: The comparison of performance and behavior change do not always require much to trace. A simple indicator can be used to examine the possible effect of EPSS. The result can also provide another source of improvement for a more beneficial system.

One of the limitations of this research is that the sample size is small and the surveyed industry is concentrated since EPSS is yet at its starting stage in Taiwan. Due to the industry nature of the island and the characteristic of the applied system itself, there are more applications in high knowledge density places such as high tech and consulting industry than the others. Whether the CSFs are identical to those of other industries is yet to be understood.

The other direction for the future approach is to add the quantitative aspect for more depth to the research. Although the number of counting is used as an index of relative importance but it might not truly reflect the real impact of such factor. If a weighting system can be considered to calibrate the response, the final result could be more indicative to the key factors of successful implementation.

As an organization is a holistic entity where each part is connected to one another, the CSFs are also not isolated either. For instance, with the "Top Manager Support", it is easier to fulfill "Organizational Needs" and the resource for "Seminars" and "Training Materials" are easier to obtain as well. With the better usage of the system, "Communication" for the better modification of the system will raise the tendency to "Knowledge Management and Renewal". This shows all the CSFs are not just critical solely but will have effect on one another. One should consider a more thorough planning when implementing EPSS to increase the possibility of successful adoption.

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