

Performance Assessment of an ERP Application Developed for A Local Nonprofit Organization in Myanmar

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Abstract— An Enterprise Resource Planning (ERP) application was used predominately in manufacturing sector and hardly used in nonprofit organizations. Using ERP systems in nonprofit organizations has special features and unique requirements, unlike manufacturing and service sectors. The prime objective of this research paper is to study the performance of an ERP application in local nonprofit organizations in Myanmar. To conduct this study, ERP systems were designed and developed based on sociotechnical approach, along with Critical Successful Factors (CSFs) at Thabarwa Center, which is one of the local nonprofit organizations in Myanmar. To evaluate the performance of this ERP application, the questionnaire was developed using Leavitt's Diamond model. 50 ERP application users from ten selective local nonprofit organizations, which are providing similar services and operations like Thabarwa Center, participated in this performance assessment survey. In this research, means scores, standard deviation, reliability analysis and Pearson correlation coefficient were utilized to assess the performance. Overall mean scores and overall standard deviation exhibit that positive evaluation was received from the application users. The study concludes that the ERP application users are typically highly positive in performance evaluation and an ERP application developed for a nonprofit organization is compatible with other nonprofit organizations which are providing similar activities and services.

Keywords— Enterprise resource planning, nonprofit organization, critical success factor, performance analysis

I. INTRODUCTION

Introducing Enterprise Resource Planning (ERP) systems has greatly changed and improved the ways businesses do their working practices. Innovation of ERP systems leads to the effective and efficient use of information. ERP software provides the operation of business processes with combination of business functions such as sales and marketing, manufacturing, human resource management, procurement and supply chain management [1]. The innovation of ERP system also help the effective use of information to develop strategy making and effective decision in an organization [2].

The ERP systems are an enterprise-wide application software package which is integrated all related functions involved in the operations into a custom-built system with a single database. The systems are built with special features such as cross functional operations, coordination among the different divisions and sections, centralized database,

standardized management of information and standard operation procedures [3].

ERP systems are tremendously complex information systems. Designing, developing and implementation of those systems are necessary for expensive cost, time consuming and other resources [4]. As information systems are defined as social system, using technical and social system as effective and efficient as possible will make the most optimized use of the resources available in the organization. A sociotechnical system contains a number of elements interacting with each other, and its environment. This system is divided into two sub systems: a technical system including technology and process and social system which consists of people who are directly taking part in the information system structure.

Using ERP systems affects users from management level to operational level in the organization because it is used for cross functional operations. Previous researches on ERP systems that focused on critical success factors, such as [5] [6] [7] have mentioned that users play a critical role in the success of ERP Systems in an organization. User participation is described as the jobs, assigned tasks, and actions that employees conduct during the early stage that brings systems into existence [8].

Although ERP systems were designed and developed in the business sector, very recently many nonprofit organizations came to realize the advantages of using ERP systems and invested in information technology and used the systems for the effectiveness of their operations to achieve their missions.

These days, ERP systems are also used in Non-Government and Nonprofit organizations because the systems have a large amount of advantages to those sectors. The system makes easier to manage cross functional activities, and projects of those organizations, unlike business activities.

ERP systems are widely used in profit organizations like the manufacturing industry since systems are useful for organizing and managing the resources under a single system, reducing the cost and using the investment effectively, improving productivity, managing customer relationships, and effective communications [9]. At the same time, nonprofit organizations are dealing with several operational challenges very similar to profit organizations.

Unlike business organizations, technology can help a non-profit organization maintain control over activities and programs and keep its information protected. Numerous non-profits are investing in ERP systems to organize different activities, programs, and projects. The ERP solution helps these organizations make various activities more efficient and increase the effectiveness of the operations in the whole organization. Furthermore, they can keep up with the demands of donors or implementing tasks successfully.

Therefore, the study focuses on establishment and implementation ERP systems in nonprofit organizations management for their sustainability. Furthermore, unlike International NGOs, local nonprofit organizations require their capacity and resources to work professionally with their international donors and partners. When they provide their services to targeted groups and working with international agencies and partners, collecting, analyzing and using highly technical nature of information is necessary to implement strategies, policies and projects of the organizations while delivering their services.

Recognizing these requirements, this study was conducted to fulfil the needs and gaps of the local nonprofit organizations' information management system.

ThaBarWa Center in Thanlyin, Myanmar, a nonprofit humanitarian organization working for a noble cause, is presented as a case study of this research for system establishment and implementation from sociotechnical perspectives. The results evaluated by the end users were satisfactory. Later, ten nonprofit organizations, which have been providing very similar activities like ThaBarWa Center were selected to assess the performance of the ERP systems that have been used in ThaBarWa Center.

II. EVOLUTION OF ERP SYSTEMS AND FUTURE TRENDS

An Enterprise Resource Planning (ERP) system is a system that is designed to consolidate enterprise-wide information systems to enhance the processes and dealings in a firm [10]. The systems consist of enterprise-wide functional modules such as manufacturing, sales and marketing, administration, human resource management. The systems integrate all the functional or departmental resources into single database system to meet the specific needs.

Development of ERP systems has started in the 1960s alongside the extensive use of computers. Initially, inventory management systems were used and the early implementation was "Bill of materials" process. Materials Requirements Planning (MRP) software was developed at the beginning. A manufacturing Resource Planning (MRP II) system has been developed in the early 1980s to manage whole manufacture processes of an enterprise and included cross functional activities in the process. Increasing needs made new developments in MRPII [1].

Because of globalization, global competition, increasing e-commerce activities, information sharing via internet and electronic market has grown, ERP systems were used not only manufacturing companies but also many firms in service industry [11].

Customers, shareholders and suppliers are putting tremendous pressure on firms and organization to improve the products they are providing. They are working hard to face the challenges and also require considerable agility

because they are in competition with each other. The ERP market has rapidly grown with innovation and provision of customized solutions by vendors to meet the today business changes. The global ERP software market was valued at \$35.81 billion in 2018, and is projected to reach \$78.40 billion by 2026 [12]. According to [13] upcoming ERP systems are produced to meet the specific needs and requirements of the end-users for the betterment of the systems.

III. THEORETICAL BACKGROUND AND RELATED WORKS

Nonprofit organizations have been facing limited budgets and demanding the improvement of the services they offered. Effective financial management process such as keeping accurate records, providing financial transparency, are required to obey and comply ever-changing regulations and reporting systems. To overcome those challenges, many nonprofit organizations are utilizing Enterprise Resource Planning (ERP) solutions to manage budgets, automate data entry and reconciliation, reduce human error, and provide detailed financial reporting.

In this paper, Sociotechnical system approach was used to establish the ERP systems in a targeted nonprofit organization in Myanmar.

Sociotechnical system was developed in the 1950s, driven by the action research. The sociotechnical system (STS) thinking was the work developed by Trist in 1947 and underpinned by Bamford and Rice. The sociotechnical system concept was used in British coal mining. Because of advanced technology, engineering efficiency experts discovered that the traditional method was not sufficient and introduced sociotechnical system. They stated that in an organization, social system coincides with technical system. In an organizational change management program, if social factors like group interactions and relationships combines with technological changes, the organizational change program will be succeeded. Consequently, productivity and performance will improve and costs and damages will be reduced. The research in the field of STS revealed that effectiveness, efficiency and self-esteem of the employees improve and strengthen if STS intervention is used systematically [14]. If an organization emphasis only on the technological intervention, the change will be intermittent [15] [16] [17].

Maximization of the organizational performance depends upon the two elements such as technology and people working together to achieve the organization's goals and objectives [18].

This theory refers to balance of boosting performance of technology and happy lives of people in the organization. Sociotechnical theory suggests many ways to increase performance in an organization by balancing people and technology when relationships between these two aspects are structured [19].

Organization development and change management may be considered as a system approach to organizational renewal. An organization is an open sociotechnical system and combination of people and technical aspects. Organizational functions and processes are connecting each other and link with other parts in the organization [20].

Making changes in any part of the organization's processes can have impact throughout the organization because all the elements in an organization are interdependent. When organizational changes are planned, the organization should be considered as open system which is connecting and keeping in touch with its environment.

An accordance with [21] to jointly optimize both the social and technical systems of the organization requires an understanding of:

1. the social process that happen in organization and the theories and techniques related to social process to use human resources more effectively and efficiently
2. the technological process that organizations uses and challenges that may affect the social system in the organization
3. the concept of open systems as the existence and environmental demands may not be identical.
4. the mechanics of change, because the initial stage and adaption to the organization to the new demand from the environment [22].

In this study, Critical Success Factors (CSFs) were considered and utilized when prepare, design, implement and evaluate the ERP systems. Significance of CSFs differs in each phase. In accordance with case empirical study and expert interviews, top-ten CSFs are top manager support, project champion, external expert, accuracy and integrity of data, precise project goal, project management, educating and training, methods and tolls implementation, business process reengineering (BPR) and evaluation of performance [23]. The results are shown in Table 1.

TABLE 1. CSFS FOR ERP IMPLEMENTATION

Elements	CSFs
Structure	Organizational Structure
Tasks	Business Process Reengineering Accuracy and Data Integrity Education and Training Effective Communication
People	Top Manager Support User Involvement Leadership and Team Lead
Technology	Project Management System Quality and Information Quality

To make an achievement of ERP implementation, a good arrangement for implementation is required to study. Limited studies were found in ERP implementation plans and using information technology in nonprofit organizations. Three studies that conduct ERP and information technology implementation will be discussed.

[9] conducted a research on an ERP Application in Turkish Red Crescent Society. The study was conducted by analyzing the Red Crescent Society's activities and processes , describing the ERP project stages, furthermore, describing unique modules related to the Red Crescent's activities. After the implementation of system, the researchers found that Turkish Red Crescent Society manages to assess the results of its strategies by gaining real-time information. As a result, effective decision can be made. The unnecessary and costly procedures in the organization are removed. New and modified procedures and operational processes are installed and standardized. ERP integration can make data transfer and

enables to reach accurate information at the right time and provide speedy services by reducing waste that lead to lean management in the organization.

[2] conducted a study on user participation in ERP systems implementation. The research concerned with the involvement of the users in the successful ERP implementation process. Well aware of role of users in the successful implementation of ERP systems is one of the key ingredients of critical success factors (CSFs). The researchers concluded that ERP implementation process is different from traditional systems development where the key focus has changed from a much emphasis on technical analysis and programming towards business process design and people focus.

[24] conducted the conditions giving a greater chance of success in investing in information technology for a nonprofit organization. The study discovered that equipping an organization with information technology or digitizing a nonprofit organization requires it to invest in infrastructure and people and effective and strategic planning. The donors are suggested to invest in computer-based information system, training and development for the employees and provide updated technology to gain the efficient and effective performance of employees and the organization.

In conclusion, sociotechnical concepts play a crucial role in organizational change management, how information technology integrate with group of people to work together to achieve the organization's goals and objectives and CSF that are crucial for ERP systems implementation.

IV. SERVEY DESIGN AND METHODOLOGY

All the participants who were end users of the software from ten nonprofit organizations which are providing very similar activities and services to Tha Bar Wa Center. The questionnaire was developed from the literature reviews.

The questionnaire was distributed to all the 50 respective staff members from the selected nonprofit organizations. The survey design was presented below.

The survey questions were designed for quantitative research study to evaluate the performance of the ERP software. The questionnaire includes five parts. They are respondents' personal characteristics and the four levels of sociotechnical factors such as structure, tasks, people and technology with the use of ten CSFs. The questionnaire consisted of a series of statement which the respondents required to provide their views about using ERP systems. A five point Likert scale was used to score ranging from 1 to 5 for each statement to indicate the degree of disagreement or agreement. For this section, 1,2,3,4, and 5 represent 'Strongly disagree', 'Disagree', 'Undecided' (Neutral), 'Agree', and 'Strongly agree'.

A. Methodology

This study was to conduct to find out the effectiveness of the performance of ERP software which was established and implemented in a nonprofit organization. The objective of the performance analysis is to understand the views of end users from other similar nonprofit organizations. The self-administered survey questionnaire with five-point Likert scale was used to collect the quantitative data. Four sociotechnical factors and ten CSFs are measured with 24 items questionnaire. Data were collected at ten selective

nonprofit organizations. Sample size is 50 staff members who are all end users of those organizations. Quantitative method and Statistical Package for the Social Sciences (SPSS) software platform was applied to analyze means, standard deviation, Cronbach's alpha and Pearson correlation statistically.

B. Background of the Study of ERP Project at ThaBaWa Center

The major aim of this study is to evaluate the ERP software developed for a nonprofit organization that is whether compatible for other nonprofit organizations which are providing similar activities and services like ThaBaWa Center. Before conducting this study, ERP systems were established and implemented at ThaBarWa Center with the aim of the center's activities systematically organizing and controlling resources, receiving, storing, analyzing and utilizing timely information to provide speedy services.

By setting up information systems there, all processes of ThaBarWa Center will provide centralized information systems. Therefore, ERP solutions based functions at the center are shown in the figure 1.

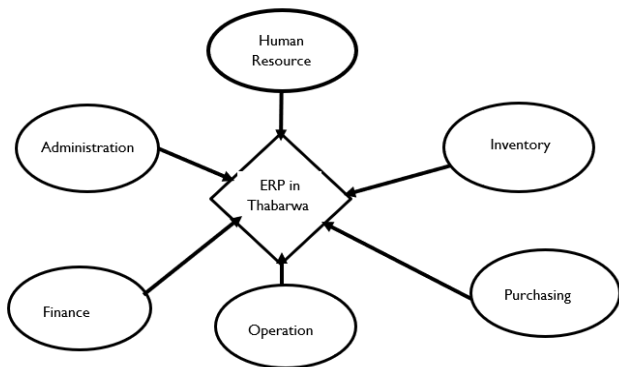


Figure 1. ERP Modules at ThaBarWa Centre

Donation management and volunteer management are the Centre's special features and added to other main modules normally utilized in ThaBarWa Center. They are explained and categorized as in following:

Administration and Human Resources Management:

This commonly used module includes management of meditation center, such as buildings, rooms and facilities management. This module also consists of human resource management functions regarding management of volunteers, and permanent staff members.

Financial Management:

This module includes basic tasks related to current cash, check-act and banking operations, accounting transactions and linking between other modules such as inventory, and purchasing.

Inventory Management:

This module contains information related to warehouse and stock, input-output-transfer process of stock and accessible amount of stock. All information links with inventory can be monitored by using this module.

Purchasing Management:

This module controls necessary resources to be used for this center. This module also manages bidding and processes of getting supplies.

Operation Management:

This module is linked with inventory, accounting and finance modules. This module offers descriptions and classification of donations, health

needs, recording and updating inventories. This module also performs room arrangement for people (yogis) who are practicing meditation at the center, managing room services and other required resources for them.

According to [25], ERP systems implementation occurs with extensive organizational change. Stakeholders require having a supporting structure and plan for change management. A General Morphological Analysis (GMA) identified Leavitt's diamond model from Sociotechnical theory is the most applicable to change management at organizational level. Sociotechnical model of change will allow stakeholders to plan, organize and control required resources for ERP implementation.

The Center's four elements related to sociotechnological system such as task, structure, people and technology were carried out the feasibility study into the current situations of the organization to adopt the appropriate change strategy in ERP implementation [26]. Those four elements in the organization were analysed at the preparation stage of the project. The findings are as follow:

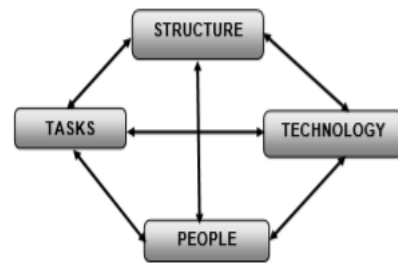


Figure 2. Leavitt's Diamond Model

Tasks in the Centre were not fully organized and some challenges were found to establish ERP systems. Organizational structures were also ambiguous and procedures were not in place. For the people part, permanent staff and volunteers have different expertise, skills and experience. Although computers were used in the centre for the purpose of data entry and recording information, centralized database system was not in place to manage information and data from different departments in the Centre.

C. ERP Systems Implementation based on Critical Success Factors in Sociotechnical Perspectives

The Critical Success Factors (CSFs) are based on the research of [27] as they identified top CSFs within ERP systems implementation with the concentration on the user perspectives. This CSFs framework will aid the study to be completed the research questions to be answered.

ERP systems will be put in an operation process at ThaBarWa Center. The systems were established based on CSFs, which are related to sociotechnical system components. The actions taken to implement the systems according to the CSFs are presented as follow:

TABLE 2. CSFs AND SOCIOTECHNICAL FACTORS

Elements	CSFs
Structure	Organizational Structure
Tasks	Business Process Reengineering Accuracy and Data Integrity Education and Training Effective Communication
People	Top Manager Support User Involvement Leadership and Team Lead
Technology	Project Management System Quality and Information Quality

In this project, big ERP vendors like SAP or Oracle were not used after weighing the advantages and disadvantages of the configuration options, budget, complexity, the capacity of the staff and project timeline. Although SAP and Oracle are two of the top ten-ranked ERP vendors in 2019 in the world [28], the challenges have been faced while utilizing the systems in nonprofit organizations. According to the one study, in 60 to 80 per cent of ERP implementation failed and did not meet expectation in higher education environments [29]. ERP was originally designed and produced with the aims to use and manage day to day business activities. Although ERP offers plentiful customization options, customization can be problematical because the options are quite inflexible. Those difficulties may lead to the risk of failure by increasing the scope of work and cost of implementation. Furthermore it can make missing implementation plans. [30]

Five stages of ERP project life cycle such as preparation, business blueprint, realization, final preparation and go live and support [1] were used to establish and implemented the ERP systems at the Centre.

The detailed actions of the project implementation at the Center were as follows. The first phase of the Implementation Roadmap is Project Preparation. Some of the tasks in Project Preparation include organizing the team, defining the system landscape (including servers and network), most importantly, defining the project's scope. In the second phase, the Business Blueprint, detailed documentation of the business process mapping that is requirements of the center's new information systems was conducted. In the third phase of the realization stage, the researcher configured the ERP software and set up the necessary networks to the settlement. The fourth phase, Final Preparation, is critical to the success of the implementation. Tasks in this phase included testing the system through put for critical business processes and setting up the operation of the Production (PROD) system and transferring data from the legacy systems. In the fifth and last phase, Go Live and Support, the center began using the new ERP systems. Schedules for the Go Live date for a period were set when the center was least busy. The researcher and the ERP project team members were scheduled to work the help desk during the first few weeks of the Go Live period.

V. RESULTS AND DISCUSSIONS

After the implementation stage of ERP systems at Tha Bar Wa Center, the performance of the systems was assess with the use of quantitative method by using self-administered survey. 50 participants were from 10 selective nonprofit organizations who are end users of the systems. The

findings of the results are reviewed by describing demographic information of the research paper as shown in table 3.

A. Demographic Information

TABLE 3. DEMOGRAPHIC CHARACTERISTICS

Variable	Frequency	Percentages(%)
Gender		
Female	23	46
Male	27	54
Age		
20-29	17	34
30-39	20	40
>40	13	26
Position		
Senior Manager	12	24
Manager	12	24
Coordinator	10	20
Staff	15	30
Types of Employment		
Volunteers	22	44
Permanent Staff	28	56
Experience		
1-3 Years	14	28
4-7 Years	28	36
Above 10 Years	28	36
Education		
High School	18	36
Bachelor's Degree	22	44
Master's Degree	10	20

B. Reliability Statistics

For the data analysis, descriptive statistics such as reliability means, standard deviation and correlation were calculated. They are shown in table 3, 4 and 5.

TABLE 4. RELIABILITY STATISTICS

Variables	No. of items	N	∞
Structure	5	50	0.732
Tasks	7	50	0.904
People	2	50	0.871
Technology	10	50	0.850

Reliability is a measure of the stability or consistency of test scores. Cronbach's Alpha for reliability can be computed as:

$$\infty = \frac{N \cdot \bar{C}}{\bar{V} + (N-1) \cdot \bar{C}} \quad (1)$$

where; N = the number of items

\bar{C} = average covariance between item-pair

\bar{V} = average variance

The study also tested the reliability of the survey instruments so that the desired and valid results are acquired. The Cronbach's Alpha has been used to check the consistency. In this research, Cronbach's Alpha values ranged between (0.732- 0.904).

Table (4) consists of reliability statistics of the questionnaire of four levels of sociotechnical systems such as structure, task, people and technology. [31] recommended Cronbach's alpha reliability coefficient equal to 0.7 or greater shows adequate internal consistency and a 0.60 level can be

used in exploratory research. The Cronbach's alphas in this study were 0.732, 0.904, 0.871 and 0.850 and they showed high reliability and internal consistency of a set of scale or test items used in this survey.

C. Overall means and standard deviation

TABLE 5. OVERALL MEANS AND STANDARD DEVIATION

Diamond Model Elements	N	Mini mum	Maxi mum	Overall Means	Overall SD
Structure	50	3.00	4.20	3.41	0.50
Tasks	50	3.29	4.86	4.05	0.57
People	50	3.00	5.00	4.45	0.76
Technology	50	3.20	3.90	3.63	0.26

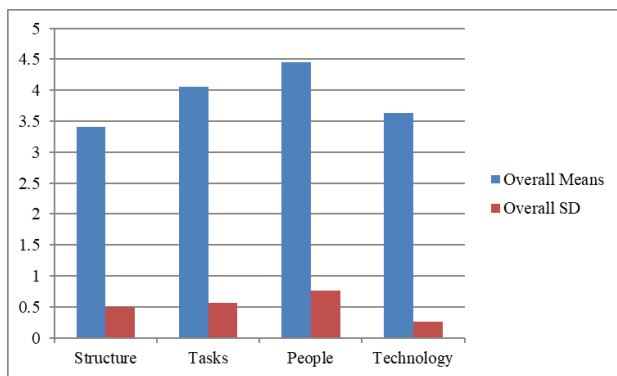


Figure 3. Overall Means and Overall Standard Deviation of the Variables

According to Swaminathan (2011), five-point scale was used in which 5 was strongly agree and 1 represented cause for room for improvement, an average score of 4 demonstrates that the respondents agree with the success of the implementation [32].

As stated in table 5, overall means of each level of this study were 3.41, 4.05, 4.45 and 3.63. It can be concluded that the respondents' evaluation on the performance analysis of the ERP Systems was positive in general.

D. Correlation

To measure strength of a linear relationship between two quantitative variables, correlation is used. The correlation coefficient between two variables x and y can be computed as:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} \quad (2)$$

Table 6 presents the scale means and correlation for the variables of this study. In comparison, ($r = 0.539$, $p < 0.01$) showed the strongest correlation between Structure and Task. And ($r = 0.717$, $p < 0.01$) exhibited the significant correlation between Structure and Technology. The correlation matrix demonstrated a statistically significant and positive correlation among those two variables.

TABLE 6. MEANS, STANDARD DEVIATION AND CORRELATION OF VARIABLES

Variables	M	SD	1	2	3	
1. Structure	3.41	0.50				
2. Task	4.05	0.57	.539**			
3. People	4.45	0.76				
4. Technology	3.63	0.26	.717**			

* $p < 0.05$, ** $p < 0.01$

Note: $P < 0.01$ is the range of values that contains with a 99% confidence the 'true' correlation coefficient.

$P < 0.05$ is the range of values that contains with a 95% confidence the 'true' correlation coefficient.

Semi-structured interviews were conducted to assess the performance of the systems after the quantitative survey. In accordance with the interview responses, the ERP implementation project gained numerous advantages for the Center. Thabarwa Centre could have the opportunities to review and evaluate their existing workflow and processes. The top management is able to make effective decision timely because of the success of the project implementation leads to the centralization of the data. Therefore, superfluous procedures, policies and processes could be eliminated and standardized operating procedures were replaced. The systems help not only the top management and heads of the department but also the employees in the operations to collaborate effectively, enhance productivity and improve communication between managers and employees.

VI. CONCLUSION AND FUTURE EXTENSION

This study was conducted to assess the performance of sociotechnical approach to ERP systems developed for a local nonprofit organization in Myanmar by ten selective local nonprofit organizations. Ten selected local nonprofit organizations were provided with the same ERP software to test its applicability. In this survey, five respondents from each nonprofit organization, a total of 50 staff members from the respective departments, participated in the survey. The results showed the strongest correlation between Structure and Task the significant correlation between Structure and Technology. The correlation matrix demonstrated a statistically significant and positive correlation among those two variables. It can also be deduced from the above known facts, there is a correlation among sociotechnical factors, CFSs and ERP Systems implementation. The results exhibited that there is a positive evaluation of the ERP Systems performance. It can be concluded that an ERP application developed for a nonprofit organization is compatible with other nonprofit organizations which are providing similar activities and services.

In the future, researchers should conduct a comparative study for nonprofit organizations that are in the different context, rendering different services and different types of operations.

REFERENCES

- [1] E.Monk and B.J.Wagner, *Concepts in Enterprise Resource Planning*. Course Technology, Cengage Learning, Boston, Massachusetts, USA, 2009.
- [2] S. Matendel and P. Ogao, "Enterprise Resource Planning (ERP) System Implementation: A Case for User Participation", *Procedia Technology*. vol. 9, pp. 518-526, 2013.
- [3] R. Amrani, F. Rowe, Marc Bidan, Bénédicte Geffroy-Maronnat and R. Marciniak, "ERP implementation and change: towards a cross-functional view", In: Proc. Conference on the 11th European Conference on Information Systems, ECIS , Naples, Italy, pp.22-40, 2003.
- [4] E.J, Umble, R.R. Haft & M.M Umble, "Enterprise resource planning: Implementation procedures and critical success factors," *European Journal of Operational Research, Elsevier*, vol. 146, no.2, pp. 241-257, 2003.
- [5] K. Alfawaz, Z. Salti and T. Eldabi." Critical Success Factors in ERP implementation". Presented at European and Mediterranean Conference on Information Systems. Dubai, 2008.
- [6] J. Esteves and J. Pastor. "Enterprise Resource Planning Systems Research: An Annotated Bibliography". *Communications of AIS*. vol.7. no.8. August 2011. [Online serial]. Available: <https://aisel.aisnet.org/cais/vol7/iss1/8>. [Accessed August 17, 2020.
- [7] L. Zhang, M. K.O. Lee, Z. Zhang and P. Banerjee, "Critical Success Factors of Enterprise Resource Planning Systems Implementation Success in China". In Proc. the 36th Annual Hawaii International Conference on System Sciences, HICSS 2003. Institute of Electrical and Electronics Engineers Inc., 2003.
- [8] H. Barki and J. Hartwick, Measuring User Participation, User Involvement, and User Attitude. *MIS Quarterly*, vol.13, no.1, pp. 59-82, 1994.
- [9] E. Gundogar, A. Aydin, H. Sunter, and Arici. "An ERP Application In A Non-Profit Organization: Turkish Red Crescent Society," *International Journal of Management & Information Systems (IJMIS)*, vol.14, no.5, pp.87-97, 2010.
- [10] R. Addo-Tenkorang and P. Helo, "Enterprise Resource Planning (ERP): A Review Literature Report," in *Proc. of the World Congress on Engineering and Computer Science*, Vol II. San Francisco, USA, October 19-21, 2011, Accessed on Nov.5.2020.[Online]. Available: https://www.researchgate.net/publication/235256628_Enterprise_Resource_Planning_ERP_A_Review_Literature_Report
- [11] L. J. Menor, M. V. Tatikonda and S.E. Sampson, "New service development: areas for exploitation and exploration", *Journal of Operations Management*, vol.20, pp. 135-157, 2002.
- [12] R. Rake, "Asia-Pacific ERP Software Market by Deployment Model, Business Function, Industry Vertical, and End User: Opportunity Analysis and Industry Forecast, 2019-2026," Allied Market Research, Pune, India, 2018. Accessed on Nov., 5, 2020.[Online]. Available: <https://www.alliedmarketresearch.com/press-release/asia-pacific-erp-software-market.html>
- [13] B. Johansson, 2007, "Why Focus on Roles when Developing Future ERP Systems," presented at International Conference on Information Systems Development, NUI Galway, Ireland, Aug. 2007, [Online]. Available: <https://lup.lub.lu.se/search/publication/47d5717a-a2ff-499c-b32a-330bea419f9a>
- [14] M. Cheung-Judge and L. Holbeche, *Organization Development: A Practitioner's Guide for OD and HR*. London, UK: KoganPage, 2011.
- [15] A.K. Rice, *Productivity and Social Organization: The Ahmedabad Experiment*, London: Tavistock Publications,1958.
- [16] F.E. Emery, E.L. Trist, C.W. Churchman and M.Verhulst, "Sociotechnical systems: Management Science Models and Techniques", vol.2, pp.83-97, 1960.
- [17] E.L. Trist and K.W. Bamforth," Some social and psychological consequences of the Longwall method of coal-getting". *Human Relations*, vol.4, pp.3-38.1951.
- [18] W. Pasmore, C Francis, J Haldeman and A. Shani. "Sociotechnical Systems: A North American Reflection on Empirical Studies of the Seventies." *Human Relations*, Vol. 35, no.12, pp.1179-1204, 1982.
- [19] R. Cooper & M. Foster. "Sociotechnical systems." *American Psychologist*, Vol. 26, no.5, pp.467-474, 1971.
- [20] D.R. Brown and D. Harvey, *An Experiential Approach TO Organization Development*, 7th ed. Pearson Education, New Delhi, 2006.
- [21] D.L. Anderson, *Organization development : the process of leading organizational change*, 2nd ed. Sage, London, 2012.
- [22] W.A. Pasmore, and J.J. Sherwood, Eds, Sociotechnical systems: a sourcebook. La Jolla, California: University Associates, 1978, pp.3-7.
- [23] C. Guang-hui, L. Chun-qing, and S. Yun-xiu, "Critical Success Factors for ERP Life Cycle Implementation," in "Research and Practical Issues of Enterprise Information Systems, vol. 205, Tjoa, A.M., Xu, L., ed. Chaudhry,S., (Boston:Springer), 2006, pp.553-562.
- [24] A.Saigal, " A Study on the Impact of Information Technology Use on Nonprofit Organizations." M.S. thesis, Dept. Computer information system, Grand Valley State University, Michigan, United States, 2008.[Online].Available: <https://scholarworks.gvsu.edu/cgi/viewcontent.cgi?article=1670&context=theses>
- [25] J. Nair, D. Reddy, and A. Samuel, "Socio-Technical Change Perspective for ERP Implementation in large scale organizations," in Encyclopedia of Information Science and Technology, 4th ed., M. Hamad et al, Ed. Hershey: IGI Global, 2018, pp.827-840.
- [26] J. Nair, D. Reddy and A. Samuel. "A Framework for ERP System Implementation Socio- Technical Change Management Perspective". *International Journal of Business Derivatives*. vol.1, no.1. 185-235. 2011.
- [27] E. Reitsma, P. Hilletoft, "Critical success factors for ERP system implementation: a user perspective", *European Business Review*, vol.30. no.3, pp. 285-310. 2018.
- [28] A. Pang, M.Markovski and A.Micic, "Top 10 ERP Software Vendors, Market Size and Market Forecast 2019-2024," Apps Run the World, Dublin, The Republic of Ireland, Jan. 21, 2021.[Online]. Available: <https://www.appsruntheworld.com/top-10-erp-software-vendors-and-market-forecast/>
- [29] G.Seo, "Challenges in Implementing Enterprise Resource Planning (ERP) system in Large Organizations: Similarities and Differences Between Corporate and University Environment," M.S. thesis, Dept. Inf. Technol., The MIT Sloan School of Management, Cambridge , Massachusetts, USA. 2013.[Online]. Available: <https://api.semanticscholar.org/CorpusID:1617582>
- [30] L. Mehlinger, "Indicators of Successful Enterprise Technology Implementations in Higher Education," Ph.D. Dissertation, Dept. Bus., Morgan state University. Baltimore, Maryland, USA. 2006.
- [31] J.F. Hair, W.C. Black, B.J. Babin, R.E. Anderson, R.L. Tatham , *Multivariate Data Analysis*, 7th ed. New York, Nj: Pearson Education Limited, 2013.
- [32] S. Selvakumar, "Critical Success Factors of ERP Implementation", M.S. thesis, Dept. Mech. Eng., Univ. Toledo, Toledo, OH, USA, 2011.