Proceedings of the Informing Science + Information Technology Education Conference

*An Official Publication of the Informing Science Institute*
*InformingScience.org*

*InformingScience.org/Publications*

**Online July 6-7, 2022**

# UNDERSTANDING THE VALUE OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS

| | | |
|---|---|---|
| Teboho Talasi* | Department of Information Systems, University of Cape Town, Cape Town, South Africa | stebodi@yahoo.com |
| Lisa F. Seymour | Department of Information Systems, University of Cape Town, Cape Town, South Africa | lisa.seymour@uct.ac.za |

* Corresponding author

## ABSTRACT

| | |
|---|---|
| Aim/Purpose | The purpose of this research is to explain how ERP systems provide value to companies in Lesotho, a developing country. |
| Background | The percentage of organizations with Enterprise Resource Planning systems (ERPs) has been increasing in both developed and developing nations. Despite the popularity of ERPs, the literature has shown that ERP failure is a major challenge facing organizations. Companies invest a considerable amount of money into these systems, expecting a return on investment. Yet, findings on the benefits that organizations accrue from the implementation of ERPs are mixed. There are concerns that in developing countries the return is low. |
| Methodology | An online survey strategy was used for collecting data from companies. Using the simple random method, 169 companies using ERP systems were selected. |
| Contribution | The core contribution is in supporting proposed relationships that had not been tested prior. The empirical results of this study describe the Lesotho ERP context. The results also emphasize the importance of the use of ERP in determining the value of ERPs. |

Accepted by Editor Michael Jones | Received: March 31, 2022 | Revised: May 29, 2022 | Accepted: May 31, 2022.

Cite as: Talasi, T, & Seymour, L. F. (2022). Understanding the value of enterprise resource planning (ERP) systems. In M. Jones (Ed.), *Proceedings of InSITE 2022: Informing Science and Information Technology Education Conference*, Article 26. Informing Science Institute. https://doi.org/10.28945/4983

| | |
|---|---|
| Findings | This study has confirmed that ERP usage and business processes improvement are the main factors affecting ERP value, and ERP usage is the strongest determiner of ERP value. The finding also emphasizes the importance of organizational culture and training. |
| Recommendations for Practitioners | Companies are encouraged to focus on training users and build a supportive organizational culture. |
| Recommendations for Researchers | Context plays a vital role in determining ERP value and hence should be taken into account when explaining ERP value. |
| Impact on Society | The paper highlights the impact of organizational culture on ERP usage and business process improvement and hence ERP value. |
| Future Research | While this study focused on training quality, further studies could focus on the impact of training quantity and ongoing training. |
| Keywords | ERP value, TOE, ERP success factors |

## INTRODUCTION

To keep pace with the competitive global market, organizations are pressured to invest in the latest Information Technology (IT) (Sedera et al., 2016). Today's dynamic business environment, operational processes, and supply chains also require systems that are capable of handling complex business operations (Ali & Miller, 2017; Bitsini, 2015). As a result, companies invest in complex IT such as Enterprise Resource Planning systems (ERPs). ERPs are systems that can integrate core business processes into unified functions, thereby improving performance and enhancing competitive advantage within an organization (Mutongwa & Rabah, 2013). These systems can also centralize data, thereby reducing its redundancy (Ali & Miller, 2017). ERPs have rapidly spread across organizations worldwide, especially in large organizations (Panorama Consulting Group, 2019). For example, in 2018, ERPs had a market share of $35 billion globally with an annual growth of 10% and are projected to reach $61.69 billion by 2025 (Bhatt et al., 2021).

Despite the continued popularity of ERPs, the literature has shown that ERP failure is a major challenge facing organizations (Ravasan & Mansouri, 2014). Because of their complex nature, ERP benefits remain difficult and unpredictable to achieve (Bitsini, 2015; Staehr et al., 2012). While the failure rate of ERPs has been reported globally, a low successful implementation rate of ERPs in developing countries is concerning (Bailey et al., 2015; Le & Han, 2016; van Vuuren & Seymour, 2013). Many businesses that invested in ERPs have become bankrupt or have been forced to close (Ravasan & Mansouri, 2014). The failure of organizations will negatively impact the economy. The adoption of ERP is increasing in developing countries, fueled by improved economic growth in these nations and ERP market saturation in developed countries (Asamoah & Andoh-Baidoo, 2018). The COVID-19 pandemic has also accelerated digital transformation in developing nations which has driven IT adoption (Soto-Acosta, 2020).

Contextual issues are major challenges to IT adoption in developing countries where inadequate IT infrastructure, a particular culture, and economic conditions are still major challenges (Tobie et al., 2016). Yet there are limited studies on the value of ERP in developing countries, particularly in the African context (Tobie et al., 2016), leaving low-income countries like Lesotho understudied (The World Bank, 2020; Tobie et al., 2016). This gives the opportunity to investigate the value of ERP in Lesotho organizations.

Lesotho is a low-income, small landlocked, mountainous country with a low gross domestic product (GDP) per capita. The country's economy is dependent on the agriculture sector, manufacturing sector, and mining sector (The World Bank, 2020). Lesotho companies were driven to adopt ERPs by global competition (Rantšo, 2016). Because of high implementation costs, only large entities like

Electricity Companies, Water and Sewerage Companies, and others adopted ERPs (Kabanda et al., 2019). Lesotho has a poor ICT infrastructure, particularly in rural areas. According to The World Bank Report (2020), Lesotho's fixed broadband penetration is one of the lowest in Southern Africa, with 0.2%. These challenges increase the risk of ERP implementation failure. Hence the purpose of this study is to explain how ERP systems provide value to these companies. Definitions of ERP value, an overview of related research work, and the theoretical framework for the study are now presented.

## LITERATURE REVIEW

Even though the value of ERPs is defined in several ways, the following definition by Uwiseyemungu and Raymond (2012) was accepted as a working definition in this study: "the value added by automation, informational and transformational effects of ERP capabilities upon the firm's operational and managerial processes" (p. 69). The business value of ERPs has been conceptualized into two parts: potential value and realized value (Dewan & Min, 1997). The potential value refers to the maximum ERP value or benefits provided by a successfully implemented ERP system. Realized values represent actual benefits provided by the ERP system (Uwiseyemungu & Raymond, 2012).

### *CRITICAL SUCCESS FACTORS*

Because of increasing ERP implementation failures and varying ERP benefits, many studies have reported on Critical Success Factors (CSFs) influencing ERP success (Ram et al., 2013). These factors were meant to assist managers in planning and executing ERP systems successfully (Kamdjoug et al., 2020). Some CSF classifications are across the ERP lifecycle (Anaya, 2013), whereas some CSF classifications are based on the specific ERP implementation phase (Staehr et al., 2012). Some scholars have focused on Small and Medium Enterprises (SMEs) (Chatzoglou et al., 2016; Moeuf et al., 2020; Ruivo et al., 2016), while others focused on large entities (Ram et al., 2013; Saade & Nijher, 2016; Xu et al., 2017). Others went further to compare CSFs between developed and developing countries (Asemi & Jazi, 2010). However, few of these studies are from an African context. Yet literature has revealed that developing countries are faced with different ERP challenges, such as a weak economy, inadequate IT infrastructure, government regulations, lack of skills, and cultural issues (Bailey et al., 2015; Bitsini, 2015; Eyitayo, 2014; Tobie et al., 2016).

Various researchers have associated ERP failure to misalignment of ERP designs with business processes, poor consultant effectiveness, management issues, over-reliance on heavy customization, poor quality of business process reengineering, high staff turnover, inadequate IT infrastructure, the technicality of the system, unskilled users, project management issues, and organizational culture (Asemi & Jazi, 2010; Bailey et al., 2015). Some researchers argue that the risk of failure is more linked to organizational factors than technical factors (Saade & Nijher, 2016). Bitsini (2015), focusing on developing countries, has identified inadequate infrastructure, economic factors, implementation cost, political and state policies, system misfit, and organizational culture as inhibitors to successful ERP implementation.

### *ERP SUCCESS FACTORS*

Implementing an ERP system can be an exceptionally complex process that depends on numerous factors (Nawaz & Channakeshavalu, 2013). The ERP implementation process is a process of the ERP software interacting with a social system, which is internal or external to the organization (Staehr et al., 2012). It is also an organizational change happening over some time, which affects not only organizational structure but also work practices (Staehr et al., 2012). During this process, internal and external factors influence the desired outcome either positively or negatively. While extensive work in investigating CSFs for ERP implementation is acknowledged, many studies have focused on merely listing factors influencing ERP benefits, while ignoring relationships among the factors

(Staehr et al., 2012). The implementation process is often treated as static, without considering the interactive effects of the CSFs and the organizational environments (Staehr et al., 2012).

## *ERP Value and Benefits*

Extensive work on the relationship between ERP investments and value realization in terms of ERP benefits has been reported. Organizations invest in ERPs to obtain desired benefits for improved business processes. These benefits may come in tangible and intangible forms (Xu et al., 2017). According to Xu et al. (2017), intangible benefits are more visible than tangible benefits. However, these anticipated benefits are not always achievable due to various factors surrounding ERP implementation (Bitsini, 2015). ERP benefits also vary across industries (Staehr et al., 2012). Shang and Seddon's (2000) framework is a widely used framework for explaining ERP benefits (Staehr et al., 2012). Shang and Seddon (2000) have classified these benefits into five categories: operational, managerial, strategic, IT infrastructure, and organizational. Staehr et al. (2012) used the framework to develop a model for explaining how and why benefits are achieved from the ERP system. The study identified nine themes that were categorized into three groups that are interlinked to achieve business benefits. The first group (contextual theme) consisted of environmental context, organizational context and chartering, and project phases. The second category (business benefits enablers) consisted of technochange/change management, education, training and support, and people resources. The third category (business benefit drivers) consisted of efficient and effective use of the ERP system, business process improvement, and new projects/extensions of existing projects to leverage off the ERP system.

## *Technology-Organizational-Environmental Framework*

The Technology-Organizational-Environmental (TOE) framework of DePietro et al. (1990) was used to explain how internal and external factors affect ERP success at the firm level (Ruivo et al., 2017). The framework has a theoretical basis and empirical support for ERP implementation studies (Egdair et al., 2015). The framework consists of three main elements; namely, technological context, organizational context, and environmental context. Technological context refers to both internal and external technologies surrounding the firm (Egdair et al., 2015). Organizational context refers to organizational characteristics affecting the implementation of IT (Egdair et al., 2015). The environment context is made up of external factors that may affect the use of IT (Xu et al., 2017). These contexts are influential in determining the extent of ERP use (Ruivo et al., 2017). The framework has been used by several studies for explaining ERP adoption and implementation (Ruivo et al., 2016: Xu et al., 2017). Despite the popularity of the TOE framework, it does not focus on the individual level, yet individual characteristics such as the attitude of users do influence the use of the ERPs.

## *Proposed Model*

The ERP business value conceptual model depicted in Figure 1 was developed based on Staehr et al.'s (2012) work and the TOE framework. The conceptual model has three components. The first component (context variables), according to the TOE framework, has three categories: technological dimension, organizational dimension, and environmental dimension. While the technology context consists of IT compatibility and complexity, the organizational context consists of business process fit, training, organizational ERP extension, and organizational culture. The environmental context consists of the number of years since ERP implementation. The second component (business enablers) from Staehr et al.'s (2012) model comprises three variables; namely, the functional extent of the ERP system/implementation, business process improvement, and ERP usage. The last part of the model is the ERP value as defined in Shang and Seddon's (2000) framework. Each hypothesis is now described.

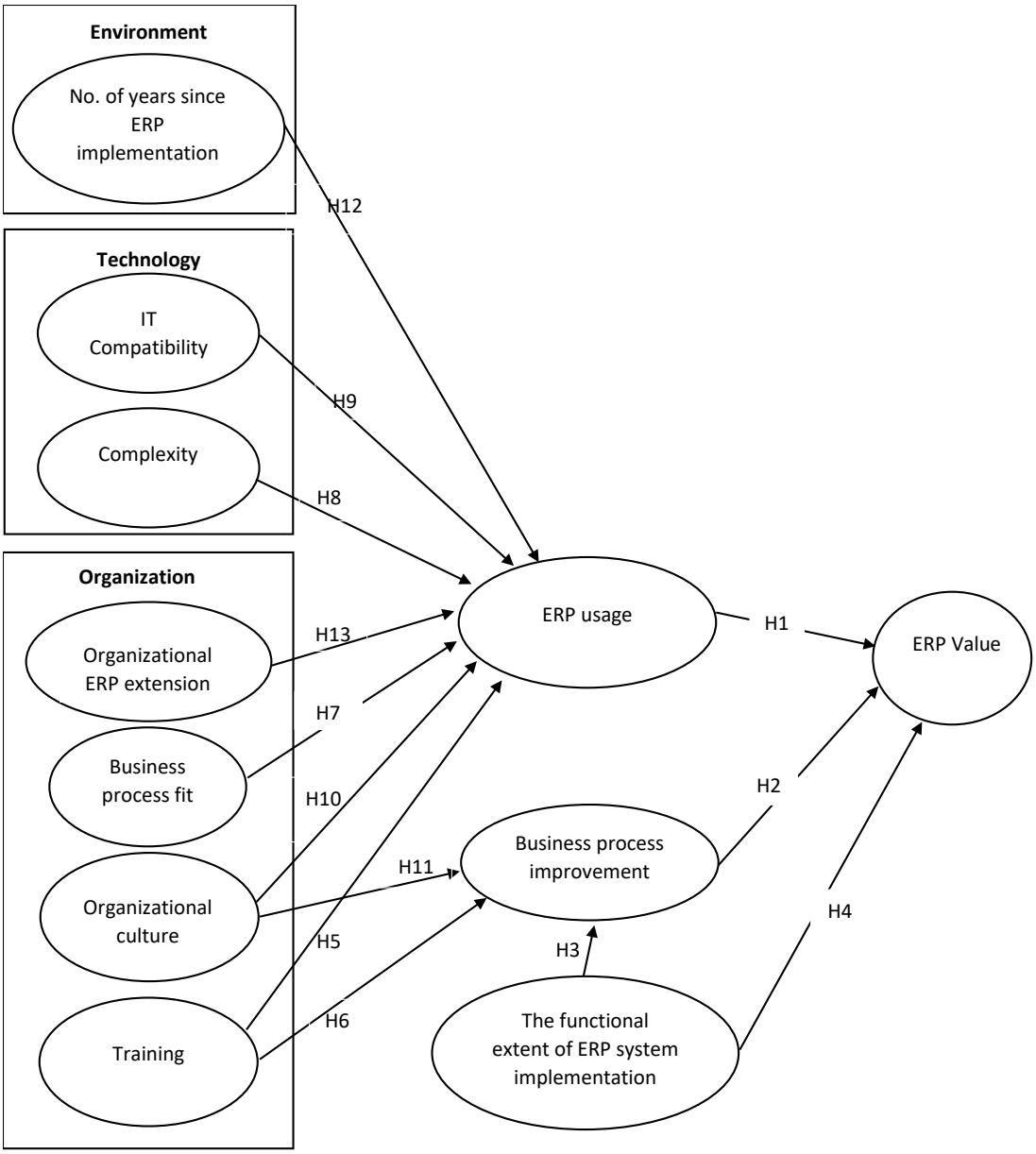


**Figure 1. ERP business value creation model**

ERP systems are end-to-end integrated software applications that depend on practical system usage (Asamoah et al., 2015; Ruivo et al., 2017). Given the challenges experienced by African nations, ERP usage is critical. Therefore, it is hypothesized that:

H1: ERP usage (ERPU) positively influences the ERP business value (SV).

Business practices are often different depending on the context in which the business is operating (Bailey et al., 2015). African countries have a specific way of doing business (Tobie et al., 2016). In contrast, ERP systems are global products built based on best practices (Bailey et al., 2015). This contradiction forces ERP implementers to reengineer their business processes to fit the ERP system (Bitsini, 2015). These major changes brought by an ERP system are claimed to eventually improve business processes, contributing to ERP business value creation (Ha & Ahn, 2014; Lotfy & Halawi, 2015; Staehr et al., 2012). Hence, the following hypothesis is put forward:

H2: The extent of business process improvement (BPI) is positively associated with ERP business value creation (SV).

The extent of ERP implementation is not only linked to business process improvement but is also associated with improved ERP outcomes (Karimi et al., 2007). Adding more modules improves the functionality of the system, which in turn increases system benefits (Asamoah et al., 2015). Therefore, it is claimed that:

H3: The functional extent of ERP system implementation (FESI) is positively associated with improved business processes (BPI)
H4: The functional extent of ERP system implementation (FESI) is positively associated with ERP business value creation (SV)

ERP systems demand rigorous training for successful ERP systems implementation (Dezdar, 2012). The level of training provided gives employees confidence in using the system (Rajan & Baral, 2015). This level of training leverages employees' attitudes towards using the system rather than implanting resistance to a newly implemented system (Nwankpa, 2015). Lack of training has been highly associated with reduced usage, which in turn leads to ERP failure (Rajan & Baral, 2015). Training is most critical in African countries where IT maturity and IT experience are still enormous challenges (Al-Debei & Al-Lozi, 2012; Rajan & Baral, 2015). Therefore, the following hypotheses are postulated:

H5: The quality of training provided to employees (T) will positively influence the use of the ERP system (ERPU).
H6: The quality of training provided to employees (T) will positively influence business process improvement (BPI).

Considering that ERP systems are western software, their design assumptions are based on western culture (Egdair et al., 2015). In contrast, African nations are characterized by their own way of doing business (Bailey et al., 2015). This contradiction is likely to cause a misfit challenge between the organizational setting and an ERP design (Bailey et al., 2015). Therefore, it is argued that ERP system usage is influenced by business process fit (BPF).

H7: ERP systems, which are not customized to fit African countries' business processes (BPI), are likely to be used less (ERPU).

An ERP implementation is very complex and risky (Rajan & Baral, 2015). Given the complexities and risks associated with ERP implementation, implementing them in African nations poses a considerable challenge. Complexity refers to the degree to which an ERP system is perceived to be difficult (Maldonado & Sierra, 2013). The complex nature of ERPs can negatively affect the attitude of users towards exploring ERP capabilities. Therefore, it is hypothesized that system complexity will have a negative impact on ERP usage.

H8: ERP systems, which are believed to be complex (Cox), are likely to be used less (ERPU).

IT compatibility refers to the degree to which an ERP system matches existing technology resources (Ruivo et al., 2015). These resources include technology infrastructure as well as software infrastructure. Unlike developed countries with excellent infrastructure, a strong economy, and IT supportive policies, ERP systems in developing nations are affected by limited technology infrastructure and a lack of governmental IT policies that support the implementation of ERP systems (Alhirz & Sajeev, 2015). Therefore, integration of existing technology with an ERP system is critical in determining system usage.

H9: The degree of Compatibility of ERP systems with existing hardware and software (IC) will positively influence ERP system usage (ERPU).

Considering that ERP systems originate from western nations, they were developed based on western cultural assumptions (Egdair et al., 2015). Consequently, organizations outside of western countries may find these assumptions unfavorable to their local work practices (Bailey et al., 2015). In contrast,

African countries are characterized by a particular culture that contradicts best practices embedded in ERP systems (Eyitayo, 2014). Previous studies have revealed high cultural variance between Africans and developed nations (Eyitayo, 2014). Africans are rated high in terms of power distance (Eyitayo, 2014). This means that managers in African countries feel uncomfortable with central information sharing. For example, Botswana people have been found to have a hierarchically orientated culture, contrary to ERP design that assumes the sharing of information amongst employees (Eyitayo, 2014). The ERP design aligns well with adhocracy culture, which is based on flexibility and externally orientated structures (Gregory et al., 2009). Therefore, companies with an adhocracy culture are likely to succeed in ERP implementation. Hence the following are proposed:

H10: Organizations with an adhocracy culture (OC) are likely to use ERP systems more (ERPU).
H11: Organizations with an adhocracy culture (OC) are positively associated with business process improvement (BPI).

The majority of IS scholars, including Staehr et al. (2012), have emphasized the criticality of time in ERP outcomes (Ortiz de Guinea & Webster, 2014; Staehr et al., 2012; Uwiseyemungu & Raymond, 2012). In their study, De Toni et al. (2015) have confirmed that, indeed, time plays a vital role in influencing users to interact with ERP systems more. The study revealed that users' perception of system usage is accelerated by experience in ERP usage. The more one gets used to the system, the more the system is explored. Hence, the following claim:

H12: The number of years since the introduction of the ERP system (NYEI) is positively linked to more ERP usage (ERPU).

Organizational system extension is an extension of an ERP system to cover all organizational departments and geographical company areas to allow for system integration. This integration also allows for a centralized database, which facilitates decentralized coordination, collaboration, and communication in the organization (Koufteros et al., 2010). Therefore, the relationship between organizational system extension and ERP use is postulated.

H13: Organizational ERP extension (OESI) has a positive influence on ERP usage (ERPU).

## METHOD

This study followed a quantitative deductive survey approach. The deductive approach supports testing a hypothesis constructed from an idea or conceptual framework (Saunders et al., 2007). The quantitative method not only allowed for describing phenomena numerically but was also useful in determining relationships between variables (Creswell, 2003). An online Microsoft Survey was used to collect data from respondents. A five-point Likert scale ranging from strongly agree to strongly disagree was used for the questions. To ensure content validity, previous questions from prior studies, which had a similar hypothesis to this study, were used in the questionnaire (Appendix A) but modified to suit the current research (Saunders et al., 2007). The target population was companies in Lesotho using ERP systems. The researchers obtained a list of enterprises using ERP systems in Lesotho from ERP suppliers and used a simple random sampling technique to select participants (Creswell, 2003). An online random number generator was used to generate 169 out of 300 businesses from the survey frame (Urbaniak & Plous, 2013). Out of 168 questionnaires distributed to employees, 115 responses were received, a 68% response rate. After data cleansing, 111 responses qualified for further analysis. Data were then entered into Statistica software for generating the required statistical results. Cronbach's Alpha was used to determine the reliability of constructs in measuring what is supposed to be measured. To test the validity of the data, factor analysis, which tested convergent and discriminant validity, was used to determine the well-being of the clustering of the elements. The recommended cut-off factor loading value is 0.5 (Nunnally & Bernstein, 1978). The next step was to test the normality of the data. Spearman rank-order correlation tests and multiple regression tests were then performed to validate the hypotheses. A Spearman rank-order correlation was used for assessing

the strength of the relationship between pairs of variables (Peprah, 2018). A multiple regression test was used to measure the strength of a cause-and-effect relationship between variables (Peprah, 2018).

## FINDINGS

Table 1 shows a summary of demographic data. The responses spread across various industries, with other private sectors, such as agriculture and mining, scoring the largest percentage of respondents (50%), whereas the remaining industries like services, parastatals, public sector, and manufacturing share the remaining 50% of participants. According to the Central Bank of Lesotho (2021), agriculture, mining, and quarry are the primary sectors contributing to GDP while the manufacturing and service sector are secondary GDP contributors. Interestingly, most of the respondents were middle managers (57%), followed by low-level managers (40%), confirming that indeed decision-makers participated in this survey. Companies who were in business operation for ten or more years (86%) participated more than other companies, whereas more than half of the companies participating (51%) employed more than 300 employees. Most respondents (76%) were employed by companies with more than ten years of experience in the use of ERPs. ACCPAC (48%) and Oracle (27%) were the most used ERPs amongst respondents. Most companies that participated in the survey were using more than four ERP modules and 68% of companies had added at least one module after the system had been implemented.

**Table 1. Demographic data**

| | | | | | |
|---|---|---|---|---|---|
| INDUSTRY | Public sector and parastatals (17%) | Other private sector (50%) | Manufacturing (12%) | Services (21%) | |
| POSITION | Top manager (3%) | Middle manager (57%) | Low level manager (40%) | | |
| COMPANY AGE | 1-3 years (1%) | 3-5 years (6%) | 5-9 years (7%) | > 9 years (86%) | |
| EMPLOYEES | Less than 50 people (2%) | 50-100 people (5%) | 101-200 people (36%) | 201-300 people (6%) | More than 300 (51%) |
| ERP PACKAGE | ACCPAC (48%) | Oracle (27%) | SAP (10%) | Tompro (9%) | Other (6%) |
| NUMBER OF ERP MODULES | One-two (14%) | Three (13%) | Four (31%) | More than four (42%) | |
| ERP USAGE | 0-2 years (3%) | 3-5 years (4%) | 6-9 years (17%) | > 9 years (76%) | |
| ADDITIONAL MODULES ADDED | None (32%) | One (36%) | Two (16%) | Three (3%) | More than three (13%) |

Cronbach's Alpha scores for all variables as shown in Table 2 were above recommended thresholds; hence, data were considered satisfactory for internal consistency and reliability requirements (Tavakol & Dennick, 2011). Factor loadings for the multiple item construct questions are shown in Appendix B. Generally, most of the constructs loaded above the recommended threshold. While items T13, BPF22, BPF23, BPF25, BPI31, BPI32, BPI33, and SV39 were dropped for further analysis due to their low loading factors, OESI37 was also dropped for cross-loading onto different factor groups. There were some cross-loadings between SV factor and OC factor, and cross-loadings between BPF factor and BPI factor. A new factor called ERP functionality extension (FESI) was created after item ESI34 was loaded onto the new factor (column 7). Generally, most of the constructs have loaded above recommended threshold, hence data qualified for the next step of the analysis.

**Table 2. Cronbach Alpha summary**

| CONSTRUCT | QUESTIONS | CRONBACH ALPHA | ACCEPTED QUESTIONS | REVISED CRONBACH ALPHA |
|---|---|---|---|---|
| T | 10,11,12,13 | 0.79862 | 10,11,12 | 0.76614 |
| Cox | 14,15,16,17 | 0.68878 | 14,15,16,17 | 0.68878 |
| IC | 18,19,20,21 | 0.69560 | 18,19,20,21 | 0.69560 |
| BPF | 22,23,24,25 | 0.67793 | 24 | |
| ERPU | 26,27,28,29 | 0.78930 | 26,27,28,29 | 0.78930 |
| BPI | 30,31,32,33 | 0.69763 | 30 | |
| OESI | 34,35,36,37 | 0.58585 | 35,36 | 0.70867 |
| SV | 38,39,40,41 | 0.86069 | 38,40,41 | 0.81560 |
| OC | 42,43,44,45 | 0.84914 | 42,43,44,45 | 0.84914 |
| FESI | | | 34 | |

Table 3 presents the descriptive statistics. The Likert scale of the questions spread from 1 to 5, 1 representing strongly disagree and 5 representing strongly agree. Descriptive statistics for ERP system value reveal a mean of 4.4. This shows a positive response of participants towards ERP value creation. ERP use had a mean value of 4.5, the highest value in the descriptive statistics, indicating that users were mandated to use the system. The complexity of the system had the lowest mean of 2.2 (disagree) in the descriptive statistics, suggesting that participants were negative towards agreeing with the statement that ERP is difficult to use. The results of the Kolmogorov–Smirnov (K-S) test indicate that all values are greater than 0.05 which conforms to the normality of the data (Mishra et al., 2019).

**Table 3. Descriptive statistics summary**

| CONSTRUCT | VALID N | MEAN | MINIMUM | MAXIMUM | STD.DEV. | K-S TEST |
|---|---|---|---|---|---|---|
| BPF | 111 | 3.80 | 2.00 | 5.00 | 0.65 | 0.35 |
| BPI | 111 | 3.75 | 2.00 | 5.00 | 0.56 | 0.38 |
| FESI | 111 | 3.40 | 2.00 | 5.00 | 0.62 | 0.32 |
| Cox | 111 | 2.17 | 1.00 | 4.25 | 0.56 | 0.16 |
| T | 111 | 3.69 | 1.00 | 5.00 | 0.57 | 0.20 |
| IC | 111 | 3.74 | 2.50 | 5.00 | 0.48 | 0.14 |
| ERPU | 111 | 4.48 | 1.75 | 5.00 | 0.52 | 0.21 |
| OESI | 111 | 3.82 | 2.00 | 5.00 | 0.61 | 0.24 |
| SV | 111 | 4.40 | 2.00 | 5.00 | 0.62 | 0.27 |
| OC | 111 | 3.75 | 1.25 | 5.00 | 0.68 | 0.22 |
| NYEI | 111 | 4.65 | 1.00 | 5.00 | 0.73 | 0.11 |

Table 4 shows Spearman correlation tests and regression ($R^2$= 0.36) for the dependent variable ERP value. The results indicate that other than ERP functionality extension and ERP value, all variables were correlating at a 95% significance level. Regression analysis shows that the model explains 36%

of the variance in the ERP value. Table 5 shows Spearman correlation tests and regression ($R^2$= 0.18) for the dependent variable ERP usage. The results from Table 6 show that only Organizational Culture vs. ERP Usage and organizational extent of ERP system implementation vs. ERP Usage were correlated at a 95% level of significance. Regression results indicate that the independent variables for ERP usage accounted for 18% of the total variation. Table 6 shows Spearman correlation tests and regression ($R^2$= 0.25) for the dependent variable business process improvement. The results show that all variables except ERP functionality extension and business process improvement, correlated at a 95% level of significance. Regression results indicate that the independent variables for business process improvement accounted for 25% of the total variation. These results imply that ERP usage and Business Process Improvement have a positive influence on ERP value, with ERP usage having the strongest influence. In addition, organizational culture and organizational extent of ERP system implementation have a positive effect on ERP usage. Organizations with an adhocracy culture and those that have extended their ERP internally and externally are likely to use ERP more. Adding to this, organizations with an adhocracy culture and those that provide employees with quality training are more likely to improve their business processes.

**Table 4. Spearman correlation and regression for dependent variable ERP value**

| HYPOTHESIS | RELATIONSHIP | CORRELATION VALUE (R) | SPEARMAN P-VALUE | B | P-LEVEL | RELATIONSHIP STATUS |
|---|---|---|---|---|---|---|
| H1 | ERPU vs. SV | 0.39 | 0.000 | 0.464 | 0.000 | Significant |
| H2 | BPI vs. SV | 0.33 | 0.000 | 0.257 | 0.002 | Significant |
| H4 | FESI vs. SV | 0.15 | 0.121 | 0.046 | 0.560 | Non-significant |

**Table 5. Spearman correlation tests and regression for dependent variable ERP usage**

| HYPOTHESIS | RELATIONSHIP | CORRELATION VALUE (R) | SPEARMAN P-VALUE | B | P-LEVEL | RELATIONSHIP STATUS |
|---|---|---|---|---|---|---|
| H5 | T vs. ERPU | 0.16 | 0.095 | 0.210 | 0.077 | Non-significant |
| H7 | BPF vs. ERPU | 0.18 | 0.052 | 0.069 | 0.518 | Non-significant |
| H8 | Cox vs. ERPU | -0.09 | 0.322 | -0.058 | 0.536 | Non-significant |
| H9 | IC vs. ERPU | 0.15 | 0.110 | 0.097 | 0.360 | Non-significant |
| H10 | OC vs. ERPU | 0.22 | 0.020 | 0.277 | 0.006 | Significant |
| H12 | NYEI vs. ERPU | -0.08 | 0.419 | -0.030 | 0.760 | Non-significant |
| H13 | OESI vs. ERPU | 0.23 | 0.015 | 0.012 | 0.914 | Significant |

**Table 6. Spearman correlation tests and regression for dependent variable BPI**

| HYPOTHESIS | RELATIONSHIP | CORRELATION VALUE (R) | SPEARMAN P-VALUE | B | P-LEVEL | RELATIONSHIP STATUS |
|---|---|---|---|---|---|---|
| H3 | FESI vs. BPI | 0.10 | 0.308 | 0.118 | 0.155 | Non-significant |
| H6 | T vs. BPI | 0.47 | 0.000 | 0.410 | 0.000 | Significant |
| H11 | OC vs. BPI | 0.27 | 0.004 | 0.172 | 0.063 | Significant |

## DISCUSSION AND FINAL MODEL

In this section, all the variables and their impact are described, and the section ends with the resultant explanatory model.

Consistent with existing literature (Staehr et al., 2012, Xu et al., 2017), this study found a positive linkage between **ERP use** and ERP value. These findings support the study of Staehr et al. (2012) that highlighted the importance of ERP use in obtaining ERP benefits. Companies with ERPs in African countries like Lesotho are likely to get more ERP benefits if their ERPs are used more.

The findings were consistent with existing literature that **business process improvement** is positively influential in ERP value creation (Ha & Ahn, 2014). Hence continuously working on business process improvement is encouraged for successful ERP outcomes.

There was not enough evidence linking **the functional extent of the ERP system implementation** to business process improvement. This result is in contradiction with previous studies which confirmed the association between the functional extent of the ERP system implementation and business process improvement (Karimi et al., 2007), but is in support of the study of Asamoah et al. (2015).

While the literature has revealed that the wider scope leads to more ERP benefits (Ha & Ahn, 2014), this research has found the insignificant effect of **the functional extent of ERP system implementation** on ERP value. The finding implies that the extent of ERP system implementation does not necessarily lead to ERP value creation.

Our findings do not confirm literature proposals (Dezdar, 2012) that ERP usage increases as training quality improves. Because ERPs are mandatory, users are forced to use the system regularly irrespective of training quality. Yet **training** has a positive influence on business process improvement, in support of literature (Dezdar, 2012). Therefore management is encouraged to train employees frequently to keep abreast with the dynamic business environment.

There was not enough evidence that linked **business process fit, compatibility,** and **complexity of ERPs** to ERP usage. This finding contradicts previous studies that have found the association between business process fit and ERP use (Bitsini, 2015; Nwankpa, 2015), compatibility of ERP systems with existing technologies and ERP use (Rajan & Baral, 2015), and complexity of the use of ERP (Rajan & Baral, 2015). This could be because ERP use is mandatory, and users are forced to use the system regardless of its complexity, compatibility, or process fit.

The positive relationship between **adhocracy culture** and both ERP use and business process improvement suggests that adhocracy culture plays a critical role in ERP success. These findings confirm previous studies that emphasized the importance of organizational culture (Bitsini, 2015; Eyitayo, 2014). Basotho shifted from a socialist culture to a mixture of capitalist and socialist cultures with the introduction of textile industries owned and managed by foreigners (Rantšo, 2016).

Consistent with previous studies, these findings have confirmed the positive relationship between **the organizational ERP system extension** and ERP usage (Bitsini, 2015; Eyitayo, 2014). This implies that extending the ERP system to cover all organizational departments and geographical company areas will increase the use of the ERP system.

Figure 2 illustrates the overall results of the research model. Contrary to existing literature, most of the hypotheses were not significant. Only organizational culture was significantly influential on ERP usage and accounted for 18% of the variation in ERP usage. Training was found to be important in determining business process improvement, accounting for 25% of its variation. Furthermore, ERP usage and business process improvement were found to significantly influence ERP value, accounting for 36% of its variation. Despite the influence of mandatory system usage that impacted the

ERP usage dependent variable, the overall model points out the importance of ERP use and business process improvement in predicting ERP value.

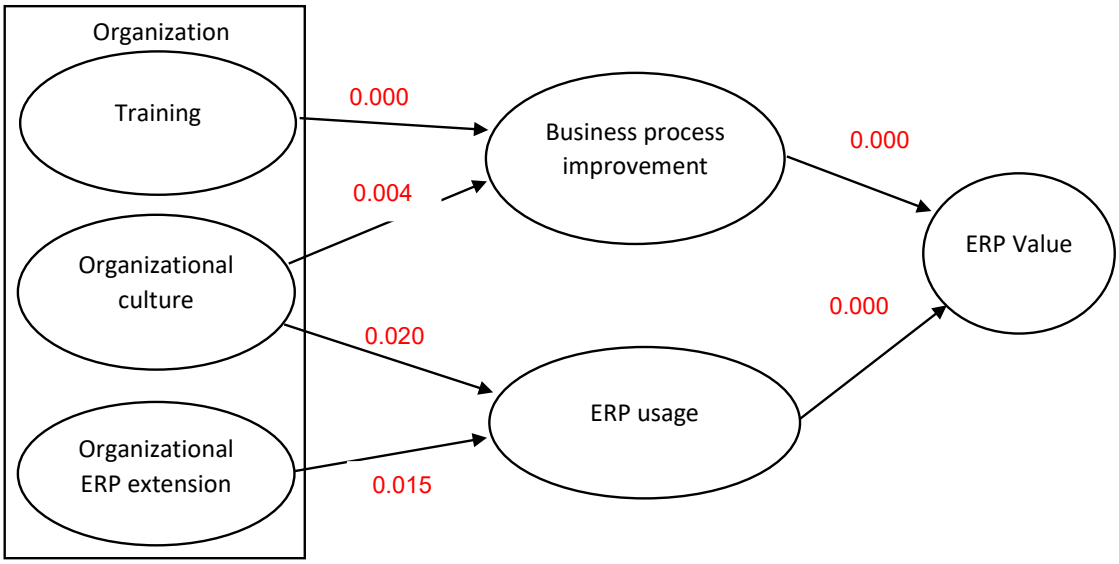


**Figure 2. Final model explaining ERP value creation**

## CONCLUSION

The purpose of this study was to explain how ERP systems provide value to companies. This study has replicated and confirmed prior studies that revealed that ERP usage and business processes improvement impact ERP value. The core contribution is in supporting the proposed relationships that had not been tested prior. The relationship between training quality and business process improvement was tentatively proposed due to user attitude and confidence (Nwankpa, 2015; Rajan & Baral, 2015) and was confirmed in this study. The dominant contribution is confirming the impact of organizational culture on ERP usage and business process improvement. This was tentatively proposed by Gregory et al. (2009).

The influence of unique contextual conditions in Lesotho organizations has been revealed. African organizations have a way of doing business different from western organizations. Likewise, Lesotho has a unique organizational culture that influences the use of ERP systems. These suggestions raised by Bitsini (2015) and Eyitayo (2014) but lacking empirical evidence are confirmed in this study. The findings of this research could be used as a basis for studying the relationship between organizational culture and the ERP value in Sub-Saharan African countries' contexts.

Due to time frame constraints and the difficulty of collecting data during the Covid-19 pandemic, the sample size was small. As a result, the study focused on companies operating in Maseru, the capital town of Lesotho. Hence, the generalization of these findings is limited. Despite the statistical relevance of the results, more studies with a broader scope and larger sample size are needed to increase the generalization of the study. Even though an online survey reached many respondents with fewer costs (Creswell, 2003), only people with access to the internet had a chance to participate. Mixing delivery and collection questionnaires with online questionnaires could minimize this limitation. The correlation testing method used to test the relationship between variables has been criticized for its accuracy compared to other correlation testing methods such as structural equation modeling (SEM) (Gefen et al., 2000). SEM is the preferred technique known for its rigorous analysis that imputes relationships between unobserved constructs from observable variables (Gefen et al., 2000). Future studies could use the SEM technique to analyze similar results. Yet the study has explained how ERP sys-

tems provide value to companies. Comparative studies for different contexts understanding influential factors determining ERP value could also be interesting studies. For example, contrasting ERP values in different industry types. Training was found to be significant for ERP value. While we focused on training quality, further studies could focus on the impact of training quantity and ongoing training.

## REFERENCES


Al-Debei, M. M., & Al-Lozi, E. M. (2012). Implementations of ICT innovations: A comparative analysis in terms of challenges between developed and developing countries. *International Journal of Information, Business and Management, 4*(1), 224-252.

Alhirz, H., & Sajeev, A. S. (2015). Do cultural dimensions differentiate ERP acceptance? A study in the context of Saudi Arabia. *Information Technology & People, 28*(1), 163-194. https://doi.org/10.1108/ITP-07-2013-0127

Ali, M., & Miller, L. (2017). ERP system implementation in large enterprises – A systematic literature review. *Journal of Enterprise Information Management*, *30*(4), 666-692. https://doi.org/10.1108/JEIM-07-2014-0071

Anaya, A. L. (2013). Realizing the benefits from enterprise information systems: A sociomaterial perspective. *Procedia Technology, 9*, 473-479. https://doi.org/10.1016/j.protcy.2013.12.052

Asamoah, D., & Andoh-Baidoo, F. K. B. (2018). Antecedents and outcomes of extent of ERP systems implementation in the Sub-Saharan Africa context: A panoptic perspective. *Communications of the Association for Information Systems*, *42*(1), 581-601. https://doi.org/10.17705/1CAIS.04222

Asamoah, D., Andoh-Baidoo, F. K., & Agyei-Owusu, B. (2015). Impact of ERP implementation on business process outcomes: A replication of a United States study in a Sub-Saharan African Nation. *AIS Transactions on Replication Research, 1*(4), 1-19. https://doi.org/10.17705/1atrr.00004

Asemi, A., & Jazi, M. D. (2010). A comparative study of critical success factors (CSFs) in implementation of ERP in developed and developing countries. *International Journal of Advancements in Computing Technology, 2*(5), 99-110. https://doi.org/10.4156/ijact.vol2.issue5.11

Bailey, L., Seymour, L., & Van Belle, J. P. (2015). Quality of work life issues in the introduction of ERP systems in a Sub-Saharan African context. *Proceedings of the 5th International Conference on IS Management and Evaluation*, 1-9. http://tinyurl.com/ICIME2015

Bhatt, N., Guru, S., Thanki, S., & Sood, G. (2021). Analysing the factors affecting the selection of ERP package: A fuzzy AHP approach. *Information Systems and e-Business Management*, *19*, 641-682. https://doi.org/10.1007/s10257-021-00521-8

Bitsini, N. (2015). Investigating ERP misalignment between ERP systems and implementing organizations in developing countries. *Journal of Enterprise Resource Planning Studies*. https://doi.org/10.5171/2015.570821

Central Bank of Lesotho. (2021). *Economic outlook*. www.centralbank.org.ls

Chatzoglou, P., Fragidis, L., Chatzoudes, D., & Symeonidis, S. (2016). Critical success factors for ERP implementation in SMEs. In M. Ganzha, L. Maciaszek, & M. Paprzycki (Eds), *Proceedings of the 2016 Federated Conference on Computer Science and Information Systems, Vol. 8* (pp. 1243-1252). ACIS. https://doi.org/10.15439/2016F37

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage.

De Toni, A. F., Fornasier, A., & Nonino, F. (2015). The impact of implementation process on the perception of enterprise resource planning success. *Business Process Management Journal*, *1*(2), 332-352. https://doi.org/10.1108/BPMJ-08-2013-0114

Dewan, S., & Min, C. (1997). The substitution of information technology for other factors of production: A firm level analysis. *Management Science*, *43*(12), 1660-1675. https://doi.org/10.1287/mnsc.43.12.1660

Dezdar, S. (2012). Strategic and tactical factors for successful ERP projects: Insights from an Asian country. *Management Research Review, 35*(11), 1070-1087. https://doi.org/10.1108/01409171211276945

Egdair, I., Rajemi, M. F., & Nadarajan, S. (2015). Technology factors, ERP system and organization performance in developing countries. *International Journal of Supply Chain Management, 4*(4), 1-9.

Eyitayo, O. (2014). Enterprise Resource Planning (ERP) systems – Is Botswana winning? A question on culture effects. *Informing Science and Information Technology, 11*, 47-55. https://doi.org/10.28945/1979

Gefen, D., Straub, D. W., & Boudreau, M.-C. (2000). Structural equation modelling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, *4*(7), 1-78. https://doi.org/10.17705/1CAIS.00407

Gregory, B. T., Harris, S. G., Armenakis, A. A., & Shook, C. L. (2009). Organizational culture and effectiveness: A study of values, attitudes, and organizational outcomes. *Journal of Business Research*, *62*(7), 673-679. https://doi.org/10.1016/j.jbusres.2008.05.021

Ha, Y. M., & Ahn, H. J. (2014). Factors affecting the performance of Enterprise Resource Planning (ERP) systems in the post-implementation stage. *Behaviour & Information Technology, 33*(10), 1065-1081. https://doi.org/10.1080/0144929X.2013.799229

Kabanda, S., Pitso, N., & Kapepo, M. (2019). The role of institutional pressures in the adoption of e-procurement in public institutions in developing countries: The case of Lesotho. *The African Journal of Information Systems*, *11*(3), 232-245

Kamdjoug, J. R., Bawack, R. E., & Tayou, A. E. (2020). An ERP success model based on agency theory and IS success model. *Business Process Management Journal*, *26*(6), 1577-1597. https://doi.org/10.1108/BPMJ-04-2018-0113

Karimi, J., Somers, T. M., & Bhattacherjee, A. (2007). The impact of ERP implementation on Business Process Outcomes (BPO): A factor-based study. *Journal of Management Information Systems*, *24*(1), 101-134. https://doi.org/10.2753/MIS0742-1222240103

Koufteros, X. A., Rawski, G. E., & Rupak, R. (2010). Organizational integration for product development: The effects on glitches, on-time execution of engineering change orders, and market success. *Decision Sciences, 41*(1), 49-80. https://doi.org/10.1111/j.1540-5915.2009.00259.x

Le, M. D., & Han, K. S. (2016). Understanding the impact of ERP system implementation on firm performance-focused on Vietnamese SMEs. *International Journal of Software Engineering and its Applications*, *10*(9), 87-106. https://doi.org/10.14257/ijseia.2016.10.9.09

Lotfy, M. A., & Halawi, L. (2015). A conceptual model to measure ERP user-value. *Issues in Information Systems, 16*(3), 54-63.

Maldonado, M., & Sierra, V. (2013). User satisfaction as the foundation of the success following an ERP adoption: An empirical study from Latin America. *International Journal of Enterprise Information Systems, 9*(3), 77-99. https://doi.org/10.4018/jeis.2013070104

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia, 1*(22), 67. https://doi.org/10.4103/aca.ACA_157_18

Moeuf, A., Lamouri, S., Pellerin, R., Tamayo-Giraldo, S., Tobon-Valencia, E., & Eburdy, R. (2020). Identification of critical success factors, risks, and opportunities of Industry 4.0 in SMEs. *International Journal of Production Research, 58*(5), 1384-1400. https://doi.org/10.1080/00207543.2019.1636323

Mutongwa, M. S., & Rabah, K. (2013). ERP system solutions for small and medium enterprises in Trans Nzoia County – Kenya. *Journal of Emerging Trends in Computing and Information Sciences*, *4*(11), 869-876.

Nawaz, M. N., & Channakeshavalu, K. (2013). The impact of Enterprise Resource Planning (ERP) systems implementation on business performance. *Asia Pacific Journal of Research*, *2*(4), 1-18. https://doi.org/10.2139/ssrn.3525298

Nunnally, J. C., & Bernstein, I. H. (1978). *Psychometric theory*. McGraw-Hill.

Nwankpa, J. K. (2015). ERP system usage and benefit: A model of antecedents and outcomes. *Computers in Human Behaviour*, *45*, 335-344. https://doi.org/10.1016/j.chb.2014.12.019

Ortiz de Guinea, A., & Webster, J. (2014). Overcoming variance and process distinctions in information systems research. *Proceedings of the 35th International Conference on Information Systems, Auckland, New Zealand.* https://aisel.aisnet.org/icis2014/proceedings/ResearchMethods/4

Panorama Consulting Group. (2019). *2019 ERP report.* https://www.panorama-consulting.com/resource-center/erp-software-research-and-reports/panorama-consulting-solutions-2019-erp-report/

Peprah, W. K. (2018). Predictive relationships among the elements of the fraud diamond theory: The perspective of accountants. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, *8*(3), 141-148. https://doi.org/10.6007/IJARAFMS/v8-i3/4547

Rajan, C. A., & Baral, R. (2015). Adoption of ERP system: An empirical study of factors influencing the usage of ERP and its impact on end user. *IIMB Management Review, 27*(2), 105-117. https://doi.org/10.1016/j.iimb.2015.04.008

Ram, J., Corkindale, D., & Wu, M. L. (2013). Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post-implementation performance? *International Journal of Production Economics, 144*(1), 157-174. https://doi.org/10.1016/j.ijpe.2013.01.032

Rantšo, T. (2016). Factors affecting performance/success of small-scale rural non-farm enterprises in Lesotho. *Journal of Enterprising Communities: People and Places in the Global Economy*, *10*(3), 226-248. https://doi.org/10.1108/JEC-10-2014-0020

Ravasan, A. Z., & Mansouri, T. (2014). A FCM-based dynamic modeling of ERP implementation critical failure factors. *International Journal of Enterprise Information Systems*, *10*(1), 32-52. https://doi.org/10.4018/ijeis.2014010103

Ruivo, P., Oliveira, T., & Neto, M. (2015). Using resource-based view theory to assess the value of ERP commercial-packages in SMEs. *Computers in Industry, 73*, 105-116. https://doi.org/10.1016/j.compind.2015.06.001

Ruivo, P., Robrigues, J., Johansson, B., Oliveira, T., & Rebelo, J. (2017). Differences in ERP value between Iberian manufacturing and services SMEs. *Procedia Computer Science, 121*, 707-715. https://doi.org/10.1016/j.procs.2017.11.092

Ruivo, P., Rodrigues, J., Johansson, B., Oliveira, T., & Rebelo, J. (2016). Using TOE and RBV theories to define a theoretical model to assess ERP value across Iberian manufacturing and services SMEs. *Procedia Computer Science*, *100*, 474-479. https://doi.org/10.1016/j.procs.2016.09.184

Saade, R. G., & Nijher, H. (2016). Critical success factors in enterprise resource planning implementation. *Journal of Enterprise Information Management*, *29*(1), 72-96. https://doi.org/10.1108/JEIM-03-2014-0028

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research methods for business students* (4th ed.). Pearson Education Limited.

Sedera, D., Lokuge, S., Grover, V., Sarker, S., & Sarker, S. (2016). Innovating with enterprise systems and digital platforms: A contingent resource-based theory view. *Information & Management*, *53*(3), 366-379. https://doi.org/10.1016/j.im.2016.01.001

Shang, S., & Seddon, P. B. (2000). A comprehensive framework for classifying the benefits of ERP systems. In H. Chung (Ed.), *Proceedings of the Sixth Americas Conference on Information Systems*, 1005-1014. http://aisel.aisnet.org/amcis2000/39

Soto-Acosta, P. (2020). COVID-19 pandemic: Shifting digital transformation to a high-speed gear. *Information Systems Management, 37*(4), 260-266. https://doi.org/10.1080/10580530.2020.1814461

Staehr, L., Shanks, G., & Seddon, P. B. (2012). An explanatory framework for achieving business benefits from ERP systems. *Journal of the Association for Information Systems, 13*(6), 2. https://doi.org/10.17705/1jais.00299

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education, 53*(2), 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd

Tobie, A. M., Etoundi, R. A., & Zoa, J. (2016). A literature review of ERP implementation in African countries. *The Electronic Journal of Information Systems in Developing Countries, 76*(1), 1-20. https://doi.org/10.1002/j.1681-4835.2016.tb00555.x

Urbaniak, G. C., & Plous, S. (2013). *Research randomizer* (Version 4.0) [Computer software]. http://www.randomizer.org/

Uwiseyemungu, S., & Raymond, L. (2012). Impact of an ERP system's capabilities upon the realisation of its business value: A resource-based perspective. *Information Technology and Management, 13*(2), 69-90. https://doi.org/10.1007/s10799-012-0118-9

van Vuuren, I. J., & Seymour, L. F. (2013, November). Towards a model for user adoption of enterprise systems in SMEs. *Proceedings of the First International Conference on Enterprise Systems Conference*, *Cape Town, South Africa,* 1-9. https://doi.org/10.1109/ES.2013.6690079

The World Bank. (2020). *Trading for development in the age of global value chain.* https://www.worldbank.org/en/publication/wdr2020

Xu, W., Ou, P., & Fan, W. (2017). Antecedents of ERP assimilation and its impact on ERP value: A TOE-based model and empirical test. *Information Systems Frontiers, 19*(1), 13-30. https://doi.org/10.1007/s10796-015-9583-0

# APPENDIX A

**Value of ERP systems in companies: Case study of Lesotho**

This questionnaire is to be completed by lower and middle managers from different industries in Lesotho using ERP systems.

**ERP system**: An ERP system is an application system used to integrate most business functions such as planning, finance, sales, inventory, procurement, human resource, marketing, Billing, etc. for business improvement. Such software includes TOMPRO, SAP, Oracle, ACCPAC, etc.)

**1. Section 1: Demographic data**

1. Is your company using any Enterprise Resource Planning (ERP) system, system that automates business functions such as finance, procurement, billing, etc. for improvement of business performance)?
   1) Yes
   2) No
2. What type of the industry is your company operating in?
   1) Manufacturing
   2) Services
   3) Public sector
   4) Private sector
   5) Other …….
3. What position do hold in your company?
   1) Low level manager
   2) Middle manager
   3) Top manager
   4) Chief executive manager
   5) Other …….
4. How old is your company?
   1) Less than one year
   2) 1 -3 years
   3) 3 - 5 years
   4) 5 - 9 years
   5) 10 years and above
5. How many people are employed within your company?
   1) Less than 50
   2) 50 -100 people
   3) 101 - 200 people
   4) 201 - 300 people
   5) Above 300
6. What is the name of ERP system package the company is using?

1) SAP
2) Oracle
3) Tompro
4) ACCPAC
5) Other ……

7. How many ERP modules such as finance module, procurement module, etc. is your company using?
   1) One module
   2) Two modules
   3) Three modules
   4) Four modules
   5) More than four modules
8. How many years has your company been using an ERP system?
   6) Less than one year
   7) 1 -2 years
   8) 3 - 5 years
   6) 6 - 9 years
   7) 10 and above
9. How many additional modules were added after system implementation?
   1) None
   2) One module
   3) Two modules
   4) Three modules
   5) More than three modules

**2. Section 2: Main questions**

| QUESTIONS | REFERENCES | 1. STRONGLY DISAGREE; 2. DISAGREE; 3. NEUTRAL; 4. AGREE; 5. STRONGLY AGREE |
|---|---|---|
| **ERP Training** | | |
| The kind of training on the system provided to staff was adequate and detailed | Rajan & Baral, 2015 | 1 2 3 4 5 |
| Users were satisfied with the training provided to them | Rajan & Baral, 2015 | 1 2 3 4 5 |
| Staff level of understanding was substantially improved after going through the training programme | Rajan & Baral, 2015 | 1 2 3 4 5 |
| Management has invested in continuous training of employees in the post-implementation stage | Ha & Ahn, 2014 | 1 2 3 4 5 |
| **Complexity** | | |
| Using the system takes much time of employees than the traditional way of doing things | Rajan & Baral, 2015 | 1 2 3 4 5 |
| Working with ERP is so complicated, it is difficult to understand what is going on | Rajan & Baral, 2015 | 1 2 3 4 5 |
| Learning to use the system has been difficult for employees | Xu et al., 2017 | 1 2 3 4 5 |
| The system is difficult to operate compared to a traditional system | Xu et al., 2017 | 1 2 3 4 5 |
| **IT Compatibility** | | |
| The system is compatible with existing technologies | Awa et al., 2016 | 1 2 3 4 5 |
| The system is compatible with existing IT infrastructure | Rajan & Baral, 2015 | 1 2 3 4 5 |
| The system is compatible with the firm's existing software | Rajan & Baral, 2015 | 1 2 3 4 5 |
| The system is compatible with existing ICT policy | | 1 2 3 4 5 |

| **Business process fit (ERP system aligned to business needs)** | | |
|---|---|---|
| The built-in ERP functionality meets the needs required from our company | Nwankpa, 2015 | 1 2 3 4 5 |
| ERP software is customised to fit company business processes | Hsu, 2013 | 1 2 3 4 5 |
| Business processes have been re-engineered to accommodate ERP use | Hsu, 2013 | 1 2 3 4 5 |
| The system matches employees` existing operational practices | Cheng, 2018 | 1 2 3 4 5 |
| **ERP usage** | | |
| Employees use the system daily | Nwankpa, 2015 | 1 2 3 4 5 |
| Employees spend much time working with the system | Nwankpa, 2015 | 1 2 3 4 5 |
| Staff use the system very intensively | Nwankpa, 2015 | 1 2 3 4 5 |
| Many reports are generated by the system per day | Ruivo, 2015 | 1 2 3 4 5 |
| **Business process improvements** | | |
| Business processes are controlled carefully to ensure correctness in the post-implementation stage | Ha & Ahn, 2014 | 1 2 3 4 5 |
| Business processes are checked continuously to prevent defects in product/services in the post-implementation stage | Ha & Ahn, 2014 | 1 2 3 4 5 |
| Business processes are evaluated continually for improvement in the post-implementation stage | Ha & Ahn, 2014 | 1 2 3 4 5 |
| Process improvement standards are raised continuously in the post-implementation stage | Ha & Ahn, 2014 | 1 2 3 4 5 |
| **The extent of ERP system implementation** | | |
| After system go-live, more modules were installed | Nwankpa, 2015 | 1 2 3 4 5 |
| The system has been extended to cover most of our geographical company areas | Nwankpa & Roumani, 2014 | 1 2 3 4 5 |
| The system implementation has been extended to cover most of our departments/divisions | Nwankpa, 2015 | 1 2 3 4 5 |
| The system has been extended to our customers for ease of communication | Nwankpa, 2015 | 1 2 3 4 5 |
| **ERP value** | | |
| With the implementation of the system, organizational operations have improved | Staehr et al., 2012 | 1 2 3 4 5 |
| With the implementation of the system, organizational management has improved | Staehr et al., 2012 | 1 2 3 4 5 |
| With the implementation of the system, organizational strategies have improved | Staehr et al., 2012 | 1 2 3 4 5 |
| With the implementation of the system, Customer service has improved | Maldonado & Sierra, 2013 | 1 2 3 4 5 |
| **Organizational culture** | | |
| The organization is very flexible toward change and encourages innovation | Aier, S. 2014 | 1 2 3 4 5 |
| The glue that holds the company I work in together is commitment to innovation and development | Aier, S. 2014 | 1 2 3 4 5 |
| The management style in the organization is characterised by individual risk-taking, innovation, freedom and uniqueness | Aier, S. 2014 | 1 2 3 4 5 |
| Our firm emphasises on growth and acquiring new resources | Aier, S. 2014 | 1 2 3 4 5 |

# APPENDIX B

**Factor loadings (Varimax normalized), marked loadings are >.600000**

| Variable | Factor | Factor | Factor | Factor | Factor | Factor | Factor | Factor |
|---|---|---|---|---|---|---|---|---|
| T10 | 0.1592 | 0.1444 | 0.2222 | 0.2826 | 0.3469 | 0.1391 | 0.0067 | 0.6345 |
| T11 | 0.3629 | 0.2864 | 0.1098 | -0.0723 | 0.2926 | 0.0696 | 0.0528 | 0.5432 |
| T12 | 0.2646 | 0.2073 | 0.1098 | 0.1449 | -0.0702 | 0.032 | -0.0506 | 0.7353 |
| ~~T13~~ | ~~0.452~~ | ~~0.277~~ | ~~0.0189~~ | ~~0.0515~~ | ~~0.2326~~ | ~~0.2062~~ | ~~0.1147~~ | ~~0.3862~~ |
| Cox14 | -0.1704 | 0.3342 | -0.616 | -0.0713 | -0.1634 | -0.2398 | -0.0387 | 0.2096 |
| Cox15 | -0.1375 | -0.1072 | -0.7535 | -0.0437 | 0.0608 | 0.0951 | 0.0417 | -0.0363 |
| Cox16 | -0.0004 | -0.113 | -0.5585 | -0.1924 | 0.0142 | -0.3223 | -0.1785 | -0.0981 |
| Cox17 | -0.0183 | 0.1666 | -0.8053 | 0.0667 | -0.0396 | 0.0843 | -0.046 | -0.224 |
| IC18 | -0.1614 | 0.5522 | -0.198 | 0.0512 | 0.0677 | 0.1696 | 0.0149 | 0.2816 |
| IC19 | -0.0545 | 0.5714 | -0.011 | 0.1345 | -0.041 | 0.3228 | 0.0103 | 0.2323 |
| IC20 | 0.1135 | 0.8058 | 0.0194 | -0.02 | 0.0152 | 0.0793 | 0.1151 | -0.0355 |
| IC21 | 0.1437 | 0.5423 | 0.0269 | 0.2608 | 0.3967 | -0.053 | 0.3018 | 0.1389 |
| ~~BPF22~~ | ~~0.0943~~ | ~~0.429~~ | ~~0.1844~~ | ~~0.2615~~ | ~~0.0965~~ | ~~0.3129~~ | ~~-0.0519~~ | ~~0.401~~ |
| ~~BPF23~~ | ~~0.0965~~ | ~~0.4649~~ | ~~-0.1192~~ | ~~-0.0594~~ | ~~-0.0562~~ | ~~0.3769~~ | ~~-0.239~~ | ~~0.516~~ |
| BPF24 | 0.0347 | 0.4032 | -0.0535 | 0.0628 | -0.0529 | 0.6901 | 0.0177 | -0.0057 |
| ~~BPF25~~ | ~~-0.0165~~ | ~~0.3752~~ | ~~0.3679~~ | ~~0.5131~~ | ~~0.2045~~ | ~~0.1053~~ | ~~-0.1714~~ | ~~0.1254~~ |
| ERPU26 | 0.0483 | 0.1011 | -0.0145 | 0.8562 | 0.0044 | -0.0177 | 0.0882 | 0.1113 |
| ERPU27 | 0.1346 | -0.0487 | 0.0373 | 0.7147 | 0.0135 | 0.2289 | -0.1552 | 0.1573 |
| ERPU28 | 0.2947 | 0.1265 | -0.1677 | 0.5012 | 0.1384 | -0.037 | 0.3003 | 0.275 |
| ERPU29 | 0.297 | 0.0029 | 0.1698 | 0.7577 | -0.0095 | 0.1453 | -0.0578 | -0.0308 |
| BPI30 | 0.2774 | 0.0047 | 0.1388 | 0.1657 | 0.5908 | 0.2713 | 0.1701 | 0.2966 |
| ~~BPI31~~ | ~~0.3405~~ | ~~0.2433~~ | ~~-0.0297~~ | ~~0.4096~~ | ~~0.332~~ | ~~0.0044~~ | ~~-0.0961~~ | ~~0.0137~~ |
| ~~BPI32~~ | ~~0.2072~~ | ~~0.1118~~ | ~~0.1295~~ | ~~0.2727~~ | ~~0.3184~~ | ~~0.4599~~ | ~~-0.1348~~ | ~~0.233~~ |
| ~~BPI33~~ | ~~0.2854~~ | ~~0.1708~~ | ~~-0.0593~~ | ~~0.2744~~ | ~~0.3359~~ | ~~0.5027~~ | ~~0.0752~~ | ~~-0.0162~~ |
| FESI34 | -0.0002 | 0.1232 | 0.1016 | -0.1119 | -0.0161 | 0.2172 | 0.794 | -0.0625 |
| OESI35 | -0.0073 | 0.0528 | -0.0184 | 0.1187 | -0.184 | 0.7545 | 0.2987 | 0.2716 |
| OESI36 | 0.3382 | 0.136 | 0.1981 | -0.0246 | 0.0306 | 0.6492 | 0.0577 | 0.0717 |
| ~~OESI37~~ | ~~0.2756~~ | ~~-0.0036~~ | ~~0.0423~~ | ~~0.0589~~ | ~~-0.6297~~ | ~~0.259~~ | ~~0.1169~~ | ~~0.0788~~ |
| SV38 | 0.5569 | -0.064 | 0.1035 | 0.3447 | -0.2216 | 0.3139 | 0.1735 | 0.4025 |
| ~~SV39~~ | ~~0.4738~~ | ~~-0.1545~~ | ~~0.0172~~ | ~~0.252~~ | ~~-0.1836~~ | ~~0.4248~~ | ~~0.0394~~ | ~~0.4281~~ |
| SV40 | 0.6398 | 0.0809 | 0.1524 | 0.3217 | 0.0926 | 0.2237 | 0.1067 | 0.0396 |
| SV41 | 0.5399 | -0.0367 | -0.0192 | 0.3431 | -0.1592 | 0.128 | 0.0081 | 0.5098 |
| OC42 | 0.823 | 0.0002 | -0.0784 | 0.0476 | 0.0941 | 0.1084 | -0.2629 | 0.0714 |
| OC43 | 0.795 | -0.0459 | 0.0787 | 0.0683 | 0.1165 | 0.1327 | -0.046 | 0.2076 |
| OC44 | 0.7464 | 0.0243 | 0.0704 | 0.1697 | -0.1483 | -0.0199 | 0.0088 | 0.1586 |
| OC45 | 0.7685 | 0.0312 | 0.1406 | 0.0625 | 0.0248 | 0.0103 | 0.1536 | 0.0444 |
| Expl.Var | 4.9575 | 2.8699 | 2.4305 | 3.4733 | 1.8044 | 3.2079 | 1.3119 | 3.1165 |
| Prp.Totl | 0.1377 | 0.0797 | 0.0675 | 0.0965 | 0.0501 | 0.0891 | 0.0364 | 0.0866 |

# AUTHORS

**Teboho Talasi** was born in Maseru, Lesotho. Mr. Talasi has just completed his Masters in Information Systems from the University of Cape Town. He received his first degree in Information Technology from the University of the Free State and his Honors in Information Systems Management from the University of Stellenbosch. He is working at the Ministry of Water in Lesotho in the Planning Unit. His research interests include the impact of ERPs in business, the role of ERPs in education and learning, and the future of Artificial Intelligence.

**Lisa Seymour**, from the Department of Information Systems (IS) at the University of Cape Town, researches and teaches in the areas of business processes, enterprise systems, and IS education, with particular emphasis on regional development in Southern Africa. Her area includes studying how organizations, particularly within the SME and public sector in Africa, can derive benefits from their business processes and enterprise systems. She is also interested in solving educational challenges in this space and in working collaboratively on these challenges. With many years of ERP project management experience, she is chair of the SAP African Academic Board, principal researcher for ESEFA (Enterprise Systems Education for Africa), and Director of CITANDA (Centre for IT and National Development in Africa).