An Empirical Investigation of Factors Affecting ERP Impact

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Abstract

Introducing Enterprise Resource Planning (ERP) systems in an organisation often has far-reaching impacts. However the expected ERP benefits have not always materialised. When implementing ERP, most companies choose the less expensive route of modifying their business processes to fit the ERP system, but this route is not necessarily the most optimal one. This paper investigates the specific impact of Enterprise Resource Planning (ERP) systems on business processes by using nine critical success factors identified in the literature as independent variables, including team composition, top management support, project champion, communication and training. Twenty-two ERP implementations were used to analyze the impact of these variables. Despite the small sample, some interesting findings emerge although not many were fully conclusive. However, the latter finding may caution practitioners and academics about making blanket recommendations of changing all business processes to fit the ERP system.

Keywords: ERP impact, business processes, Critical Success Factors, ERP implementation, change management.

1. Introduction

An Enterprise Resource Planning (ERP) system is a "packaged software system that enables a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.) by providing a total, integrated solution for its information-processing needs" [1]. ERP systems have evolved from manufacturing control systems and the ERP trade has became a multi-billion dollar industry viewed by some as "the most important development in the corporate use of information technology of the 1990s" [2]. The importance of these systems is emphasised by high levels of sales and market penetration [3].

As packaged, centrally-developed and centrally configured systems, ERP systems are limited in the number of business processes they can model [4, 5]. Most companies choose the less expensive route of modifying their business processes to fit the ERP system, which is a well supported view among academics and practitioners [6, 7]. However, an alternative view states that prescribing a one-for-all system may not fit every company's environment and blanket change of all processes to fit the system would be a step toward sub-optimization [4].

This research aims at investigating the impact of Enterprise Resource Planning (ERP) systems on business processes.

2. Prior Research

Background

ERP systems evolved from MRP II (Manufacturing Resource Planning II) systems but unlike MRP II, which focused on manufacturing, ERP systems serve other businesses, such as distribution and services. ERP systems integrate inventory data with financial, sales, and human resources data, allowing organizations to price products, produce financial statements, and manage human, materials, and financial resources [8, 9]. ERP systems optimise and integrate business processes across the supply chain providing visibility and consistency across business functions such as manufacturing, finance, distribution and project management [10]. Many of the world's leading companies consider ERP systems as essential IT infrastructure for surviving in today's economy [3].

ERP systems became one of the largest information technology investments in the 1990s [10]. In a survey of managers responsible for implementing ERP in their organization, two-thirds viewed ERP systems as the organizations most strategic computing platform [11]. Davenport [2] states that ERP systems are "the most important development in the corporate use of information technology of the 1990s".

The importance of ERP systems is emphasised by the level of sales and market penetration [3]. In a survey of 800 U.S. companies almost half had installed an ERP system and these systems were commanding on average 43% of a company's application budget. Research into U.S. Fortune 1000 companies also indicated that over 60% had implemented an ERP system. It is estimated that 300 billion dollars were spent on ERP systems during the 1990's [3].

Failure to achieve ERP benefits

Many renowned organisations such as AeroGroup, Nash Finch, Boeing, FoxMeyer, Siemens, Panasonic and Bruno Magli have failed to implement ERP packages as planned, either departing significantly from their original design specifications or missing project deadlines [5].

The cost of software, consultants and staff training are significantly higher for ERP than for most system implementation projects. It is common for companies to spend over $ US 100 million on an ERP system

implementation. The consequences of ERP project failures are serious, considering the expenses and years of effort that these projects require [5].

"It is difficult to implement ERP because to do so successfully, one must adequately manage the rather complex and resource intensive process. Included in this process are organizational changes in many principal areas concerning strategy, technology, culture, management systems, human resources, and structure" [10]. It is claimed that the reason for so many failures is that companies have concentrated on the technical and financial aspects of the project while neglecting to take into account the non-technical and change management elements [10, 12].

About half of ERP projects fail to achieve expected benefits because managers considerably underestimate the efforts involved in managing change [5]. Hawking *et al.* [3] reinforce that ERP projects are people focused "and rely heavily on change management for success."

Addressing Failure: Identifying Critical Success Factors

Rockart [12] was the author that introduced the Critical Success Factor (CSF) approach in the information systems field. Rockart believed that CSFs are among the few methods in which satisfactory results will ensure competitive performance for the organization [13].

One of the most thorough works on the subject of eliciting key success factors of ERP implementation has been published by Nah *et al.* [1]. Their study reviewed and compared 12 empirical articles on key success factors. The study identified 11 common success factors and the degree of criticality of each of these factors was further assessed in a survey administered to the CIOs of Fortune 1000 companies.

The top identified success factors, in order of priority, are: ERP teamwork/composition, change management, top management support, BPR with minimal customization, business plan/vision, project management, communication, monitoring/evaluation of performance, software development/testing and appropriate business/IT legacy systems. (See Figure 1 for details).

Esteves and Pastor's [14] study provides the results of the open coding process from an application of the grounded theory method. They used the work published by several authors, containing commented lists of CSFs in ERP implementations. Their research was based on the work of ten other research papers which related to CSFs models. They mapped these CSFs in a matrix with four perspectives: *organizational, technological, strategic* and *tactical* (See *Figure 2*).

The *organizational* side includes organizational structure, culture and business processes. The *technological* perspective is related to the particular ERP product and related technical aspects, such as hardware and software needs. The *strategic* perspective relates to core competencies, the organization's mission and long-term goals. The *tactical* perspective concerns business activities with short-term objectives [14].

Towards an Investigation of ERP Impact on Business Processes

The implementation of an ERP package constitutes not only a large and complex technical endeavour but also requires major changes in business processes and organisational structure [5]. As packaged software, ERP systems themselves are limited in the processes that they can model and firms not being able to run their business processes on ERP, have to remodel their processes to fit the system [15].

	ERP Teamwork and Composition	*Change Management Culture and Program*	*Top Management Support*	*BPR with Minimum Customization*	*Business Plan and Vision*	*Project Management*	*Project Champion*	*Communication*	*Monitoring and Evaluation of Performance*	*Software Development, Testing and Troubleshooting*	*Appropriate Business and IT Legacy Systems*
Bingi, Sharma, and Godla (1999)	x	x	x	x						x	
Buckhout, Frey, and Nemec (1999)	x		x		x						
Falkowski, Pedigo, Smith, and Swanson (1998)	x	x			x	x	x	x	x		
Holland, Light, and Gibson (1999)	x	x	x	x	x	x		x	x	x	x
Murray and Coffin (2001)		x	x	x		x	x		x	x	
Roberts and Barrar (1992)		x	x	x	x				x		x
Rosario (2000)	x	x		x	x	x	x	x	x	x	
Scheer and Habermann (2000)										x	
Shanks et al. (2000)	x	x	x	x	x	x	x	x			
Stefanou (1999)	x						x				
Sumner (1999)	x	x	x	x		x	x	x	x		
Wee (2000)	x	x	x	x	x	x		x		x	
Number of citations	9	9	8	8	7	7	6	6	6	6	2

Note. BPR = Business Process Reengineering; IT = Information Technology.

Fig 1. Key Critical Success Factors. Taken from [1]

	Strategic	*Tactical*
Organisational	• Sustained management support • Effective organisational change management • Good project scope management • Adequate project team composition • Comprehensive business process reengineering • Adequate project champion role • User involvement and participation • Trust between partners	• Dedicated staff and consultants • Strong communication inwards and outwards • Formalised project plan/schedule • Adequate training program • Preventive trouble shooting • Appropriate usage of consultants • Empowered decision-makers
Technological	• Adequate ERP implementation strategy • Avoid customisation • Adequate ERP version	• Adequate software configuration • Legacy systems knowledge

Fig 2. Unified critical success factors model. Taken from [14]

ERP-driven Changes to Business Process

There are a number of reasons for incurring business process change during ERP implementation. First of all, ERP systems are based on best practice, that is, ERP vendors and their business partners have investigated large amounts of business practices across the industry and have adopted those they consider best into their ERP software. As a result of that, organizations that adopt the ERP-driven processes often find that performance improves [4, 15].

However, because ERP driven business practices are designed from an industry-wide point of expertise, one universal solution may not necessarily fit the environment of every organization and an alternative view is that the personnel closest to the task at hand have a thorough understanding of the business processes necessary to complete the task. Over time and before ERP, these employees would have optimized processes for the technological and environmental forces faced by the individual department. In this case, implementing ERP-driven processes would be a departure from optimal processes that have developed over time [4].

The second reason for incurring business process change during an ERP implementation, is because configuration is generally performed at corporate level, where decision makers are not fully aware of subunit business practices [4, 5].

The final reason for process alterations is the fact that an ERP system uses a single set of shared databases. Gattiker and Goodhue [15] stated that "data standards to a large extent require *process standards* as well", they explain that ERP systems permit some tailoring of business processes, but only within fixed bounds, since all the business processes are designed to work together using a single set of shared databases.

The Gattiker and Goodhue Study

Gattiker and Goodhue [4] conducted the first large scale empirical investigation of the impact of ERP systems on business processes. They surveyed over 70 organizations in the manufacturing sector and sought to find systematic relationship between ERP-driven process change and ERP impact at the subunit level. They defined ERP impact as the effect an ERP system would have on a subunit's ability to access necessary information, the ability to coordinate with other areas and the overall fit between ERP and task needs.

Gattiker and Goodhue found that organizations implementing ERP incur a large amount of ERP-driven process change. They also found that the ERP impact of such a change is positive, that is information access and the ability to coordinate between subunits improve. However, the authors found no correlation between the ERP-driven change and ERP impact. This result raises a question about the universal superiority of ERP embedded processes. If ERP embedded practices were universally 'best', one would expect to see that the more existing processes are changed to ERP embedded practices, the greater the positive ERP impact. The data however did not show such a relationship. Gattiker and Goodhue's results thus cautioned practitioners and academics about making blanket recommendations of changing all business processes to fit the ERP system.

The authors' explanation for the lack of correlation between amount of ERP-driven change and ERP impact is the need of a more nuanced view of

business process change. This is in line with other researchers stating that successful ERP implementations require consideration not only of technical but also of non-technical and change management issues [10, 13].

3. Research Objectives and Methodology

This research considers the effects of ERP systems at local, or subunit, level and, investigated the ERP-driven impacts on business processes in the context of change management aspects as defined by critical success factors.

This research is quantitative, deductive and explanatory and thus a survey method was selected. A synthesis of The Key Critical Success Factors by Nah e*t al.* [1] and The Unified Critical Success Model [14] was used to propose a set of variables that would influence ERP impact. A total of ten variables were then measured as shown in Figure 3. *ERP Effectiveness* is the dependent variable. *ERP-driven Process Change, Team Composition, Change Management, Top Management Support, Project Management, Project Champion, Communication, Monitoring and Evaluation of Performance* and *Training* are the independent variables.

The models by Esteves and Pastor [14] and Nah *et al.* [1] include subsections that define each of these variables in detail. These subsections formed the basis of multiple indicator constructs used to measure each variable.

The hypotheses were tested by stepwise regression analysis to establish the degree to which each of the independent variables influences the *ERP-Effectiveness* variable. STATISTICA software package was used for data analysis.

The survey instrument was adapted from the questionnaire used by Gattiker and Goodhue [4], which measures two variables: *ERP Change* and *ERP Impact (Effectiveness)*. Eight other constructs were added to the questionnaire in order to measure the additional variables. Multiple indicators of each variable are used so that the reliability and discriminant validity of the survey items can be estimated. A five-point Likert-style rating scale was used for each question. A questionnaire page is shown in Figure 4.

A self-administered on-line questionnaire was used. The author emphasized a more personal approach to questionnaire distribution, with personal or telephone pre-survey contact. After the initial contact an individual or a company received a URL link to the website where the questionnaire was hosted.

For this research only systems implemented after 1998 were considered to be relevant. Finally, since the definition of *ERP Impact* used in this study, includes information exchange and process standardization across subunits, it is appropriate to limit the scope of the sample to companies that have implemented ERP systems across several subunits. The sample frame for the research consisted of the following mailing lists/user groups:

SAP Higher Education and Research User Group
Africa SAP User Group (AFSUG)
Personal Contacts
EOH Consulting Western Cape client base

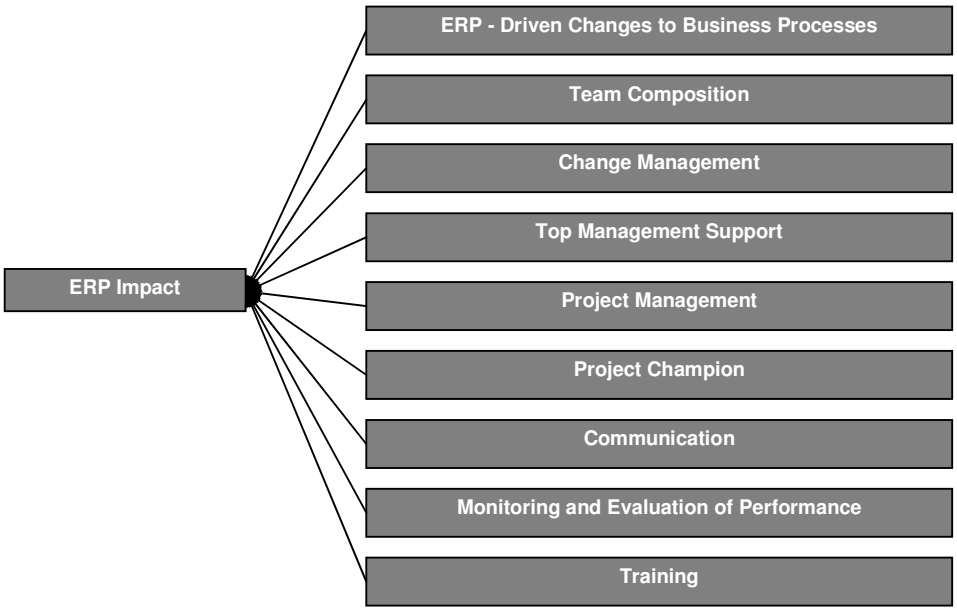

Fig 3. Variables in this Study

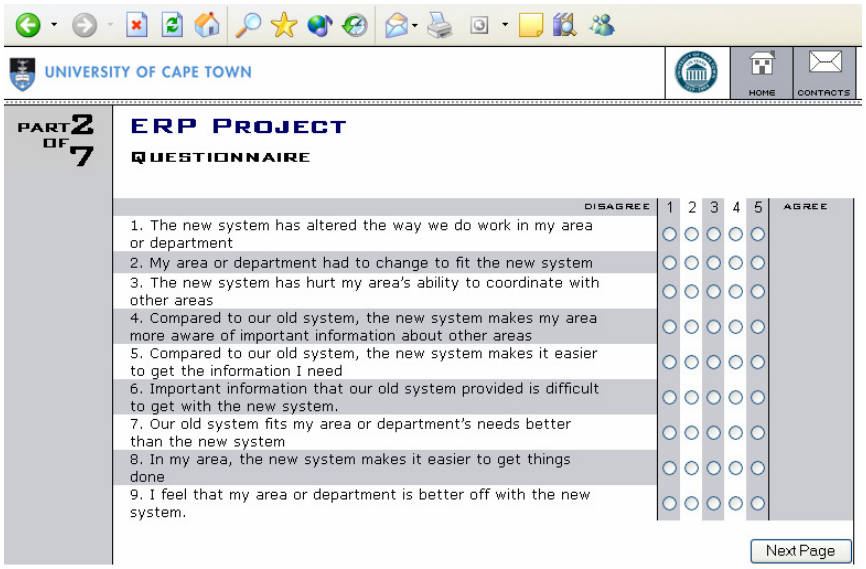

Fig 4. Questionnaire Page

4. Data Analysis

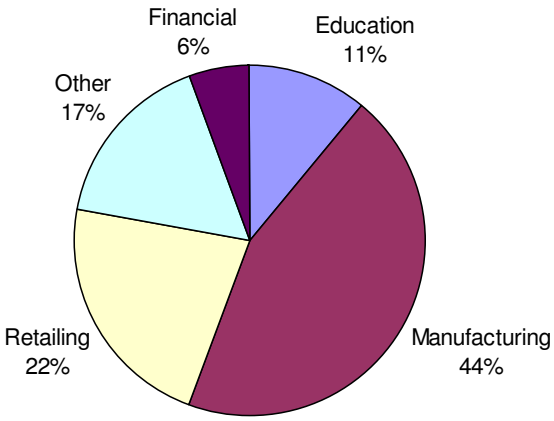

Fig 5. Respondents Industry Sector

Response Profile

Data collection proved to be the most difficult part of this project. In spite of numerous phone calls and follow-up emails, the response rate was low at about 10 percent. It must be said upfront that such a response rate may negatively influence the statistical accuracy of any conclusions that will follow. While 256 companies were contacted, only 22 responses were received, 2 of which were discarded for incompleteness.

All respondents were from South Africa apart from one USA and one Australian response. One respondent was using JD Edwards, two respondents were using Syspro and the remainder had implemented SAP. *Figure 5* show respondents' demographics according to industry.

Instrument Reliability and Validity

Factor Analysis was performed using *Verimax Normalised* rotation and indicated 11 eigenvalues. Several variables were removed as they have not loaded properly and/or have produced undesirable Cronbach's alpha results. The Cronbach's alpha results and the final factor loading which indicated 9 eigenvalues appear in *Table 1.*

Researchers explain that the required minimum sample size for factor analysis should be in the region of 100 to 200 observations [16]. In spite of a relatively small number of observations, factors loaded remarkably well. All factor loadings of a particular construct were substantially different from other constructs. *Monitoring & Evaluation of Performance (mon_evl_perf)* and *Change Management (change_mng)* variables were completely excluded from further statistical analysis as their constructs did not load on the Factor Analysis.

The first two constructs, *Change* and *ERP-Effectiveness (Eff)* were taken from Gattiker and Goodhue's study [4]. Gattiker and Goodhue achieved alphas of 0.67 and 0.91 while in this research values of 0.57 and 0.64 were obtained. These lower values of Cronbach's alpha are attributed to a limited number of observations used in this study, and should improve with larger samples. Although the *ERP Effectiveness* construct loaded over two distinct sub-factors, Factor 3 and Factor 6, both constructs loaded very well during factor analysis. The Cronbach's alpha for *Team composition (team)* was 0.64, which is good considering it is a two variable construct, the other variables in this construct were deleted after confounding loadings on factor analysis. All other

constructs have excellent alphas ranging between 0.81 and 0.94.

Stepwise Regression Analysis

Stepwise regression analysis has been used to eliminate the effects of multi-collinearity between independent variables that might mask their relationships with the dependant variable. The regression summary can be seen in Table 2 and it produced the following regression equation which explains 35% (R^2=0.352) of the total variation in the ERP_Effectiveness variable:

(ERP_Effectiveness) = 0.55(Communication) – 0.37(Training) + 3.27

Table 1: Final Factor Loading and Cronbach's Alpha

Factor Loadings (Varimax normalized) (tr.sta) Extraction: Principal components (Marked loadings are >.700000)

Cronbach's Alpha		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Factor 8	Factor 9
0.57	change1	0.280252	0.280069	0.012664	0.063353	0.187340	0.281306	**0.765062**	-0.053926	0.018139
	change2	-0.028122	-0.109811	0.002679	0.193974	-0.022529	-0.497013	**0.735741**	0.103592	0.141389
0.64	Eff1	0.118977	0.068144	0.087571	-0.006153	0.072173	**0.919776**	0.046011	-0.023226	-0.090922
	Eff2	-0.184234	0.363908	**0.748065**	-0.150647	0.254010	-0.069071	-0.060501	0.231201	0.074747
	Eff3	0.248196	0.035309	**0.776285**	0.010119	-0.311069	-0.110392	0.279610	0.199971	0.175084
	Eff6	-0.203619	0.479040	**0.759328**	-0.041274	0.137669	-0.143362	-0.105223	-0.215334	-0.081054
	Eff7	-0.095952	0.094210	0.407330	-0.109464	-0.008181	**-0.816169**	0.097421	0.098354	-0.108944
0.64	team3	-0.028313	0.106598	0.536706	0.156285	0.182876	0.069840	-0.046297	0.209117	0.686305
	Team4	-0.296242	-0.040313	-0.010655	-0.040883	-0.048126	-0.075857	0.120466	0.073312	**0.815827**
	change_mng1	0.292700	0.451180	0.320094	0.080261	0.579230	-0.286600	-0.077447	0.241989	0.260323
	change_mng2	0.268691	0.474419	0.471212	0.075405	0.573982	0.028355	-0.142580	0.029069	0.243689
	change_mng4	0.396295	0.137024	-0.227465	0.255340	0.621039	0.169334	-0.318701	0.251992	0.045226
0.94	top_m_sp4	0.214083	0.306586	-0.138826	0.475060	**0.740252**	0.117959	0.070621	-0.078168	-0.048992
	top_m_sp5	0.125287	0.356761	-0.047501	0.240849	**0.715439**	0.333509	0.107562	-0.020089	-0.276329
	top_m_sp6	0.177185	0.223083	-0.013264	0.320134	**0.742442**	0.154939	0.107851	0.147239	-0.270397
0.81	pm1	0.198230	0.183673	0.114943	-0.078046	0.083700	-0.083807	-0.013757	**0.882441**	0.162262
	pm4	0.145888	0.643473	0.190859	-0.171702	0.311738	-0.143582	0.211079	0.513729	0.239625
0.91	p_champ1	0.195126	0.155295	-0.037119	**0.868934**	-0.069466	0.019189	0.083930	0.121529	-0.186984
	p_champ2	0.349542	0.041010	-0.035274	**0.785052**	0.062641	0.020179	0.325716	-0.198056	0.066393
	p_champ3	0.238835	-0.017248	-0.012179	**0.878899**	0.231444	0.008154	-0.040260	-0.222519	0.140832
	p_champ4	-0.040628	0.073254	0.046987	**0.856478**	0.378005	0.031815	-0.054218	0.141772	0.033914
0.93	com1	0.081827	**0.782622**	0.262137	-0.073250	0.355246	0.087726	-0.043692	0.305574	0.015691
	Com2	0.440534	**0.766686**	0.164414	-0.112930	0.325474	-0.030002	0.006786	0.051101	0.034784
	com3	0.436184	**0.710272**	0.397458	0.173090	0.120006	-0.068556	-0.008391	0.127981	0.079589
	Com4	0.178599	**0.790782**	0.382656	0.280363	0.063916	0.032486	0.112369	0.075160	-0.063476
	mon_evl_perf1	0.189827	0.485942	0.304402	0.262238	-0.112886	-0.183003	0.326084	0.419040	-0.246565
	mon_evl_perf3	0.671187	0.077826	0.302649	0.134324	0.164549	0.086802	0.373650	0.269848	-0.219209
	training1	**0.769765**	0.056462	-0.105357	0.225804	0.096624	0.353631	0.154039	0.179171	-0.235410
	training2	**0.800158**	0.367119	-0.039743	0.044870	0.141986	0.037111	0.341889	0.102887	0.074900
0.91	training3	**0.772859**	0.180370	-0.032397	0.145880	0.193163	0.073654	-0.231801	0.028057	-0.181417
	training4	**0.774459**	0.137776	0.032741	0.395354	0.326379	-0.044941	0.030882	0.012973	-0.008805
	Expl.Var	4.833753	5.398526	3.487650	4.065293	5.221220	2.419545	2.054662	1.946709	1.956501
	Prp.Totl	0.138107	0.154244	0.099647	0.116151	0.149178	0.069130	0.058705	0.055620	0.055900

Table 2: Stepwise Regression Analysis summary

Regression Summary for Dependent Variable: **Eff_AVG** (tr_funalsheet.sta) R= .59362599 R²= .35239181 Adjusted R²= .27620261 F(2,17)=4.6252 p

	Beta	Std.Err.	B	Std.Err.	t(17)	p-level
Intercept			**3.273012**	**0.695369**	**4.70687**	**0.000203**
com_AVG	**0.685947**	**0.229292**	**0.553962**	**0.185173**	**2.99159**	**0.008200**
Training_AVG	-0.467039	0.229292	-0.374591	0.183904	-2.03688	0.057544

t-Tests

A simple t-test was performed on all variables. The mean scores for the variables were tested against the neutral point of 3 on the Likert scale. *Table 3* shows the summary of t-Tests. Significant values appear in red. A mean value above 3 indicates a positive trend in a variable. All variables except *Top Management Support* and *Team Composition* show a significant positive deviation from the neutral point of 3.

Table 3: t-test summary

Variable name	Mean	Standard Deviation	p value
Change	**3.80**	**0.92**	**0.001**
ERP Effectiveness	**3.92**	**0.81**	**0.000**
Team Composition	3.38	0.96	0.096
Top Management Support	3.53	1.21	0.064
Project Management	**3.88**	**0.10**	**0.000**
Project Champion	**4.00**	**0.77**	**0.000**
Communication	**3.73**	**1.00**	**0.004**
Training	**3.80**	**1.01**	**0.002**

5. Findings

From the stepwise regression it can be seen that:

Communication is **positively** related to ***ERP Effectiveness*** variable with a coefficient of **+ 0.55**.

The ***Training*** variable is **negatively** related to ***ERP Effectiveness*** with a coefficient of **- 0.37**.

It is difficult to find a logical explanation for the *Training* variable being negatively related to *ERP Effectiveness.* Certainly the literature gives no support for this outcome. On the contrary, *Training* is cited as one of the top Critical Success Factors of ERP implementation [17, 18, 19].

Authors such as Wheatley [20] and Esteves *et al.* [21], deal with ineffectiveness and inefficiency of training and propose ways to improve the *status quo*, but nowhere are the negative effects of training documented.

The only feasible explanation is that the small sample size of this study did not truly represent the population and also, possibly negatively affected the calculation of regression analysis. A larger sample size should most certainly produce a more meaningful result.

6. Implications of Findings

ERP Impact on Business Processes

As in the case of Gattiker and Goodhue's [4] study, this research found that organizations implementing ERP incur ERP-driven process change. This is indicated by *Change* variable mean value of 3.8 compared to 3 (neutral point on the Likert scale).

Figure 6 shows the distribution of *Change* variable observations as compared to neutral point of 3.

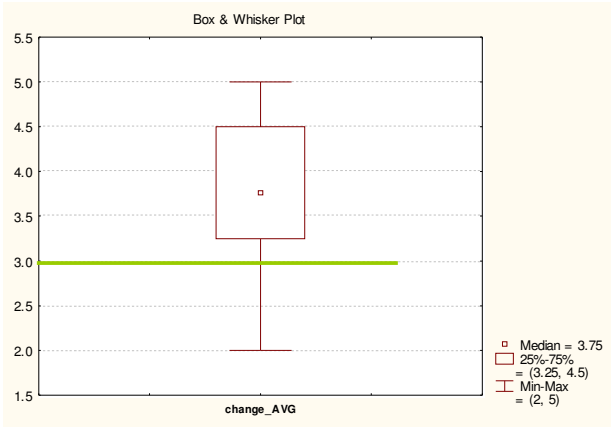

Fig 6. Box & Whisker Plot for Change variable (neutral point of 3 is indicated by a green line)

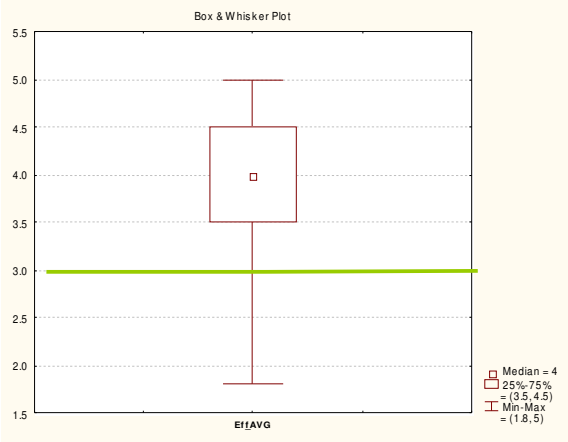

Fig 7. Box & Whisker Plot for ERP Effectiveness variable

This research also found that the *ERP Effectiveness* of such a change is generally positive, that is information access and the ability to coordinate within a particular subunit, improves. *ERP Effectiveness* has a mean value of 3.92 and its distribution is depicted *in Figure 7.*

However, this research found no correlation between the *ERP-driven change* and *ERP Effectiveness*. This result once again raises a question about the universal superiority of ERP embedded processes. If ERP embedded practices were universally 'best', one would expect to see that the more existing processes are changed to ERP embedded practices, the greater the positive ERP impact. The data however did not show such a relationship.

Although our sample is, at 20 organisations, relatively small, these results thus caution practitioners and academics about making blanket

recommendations of changing all business processes to fit the ERP system.

t-Tests Implications

While due to the limited sample size stepwise regression could not determine the correlation between most variables, simple t-tests can provide meaningful descriptions of individual variables. All variables have means above the neutral point of 3, with exception of *Top Management Support* and *Team Composition* variables whose p-values are not significant.

This is a very encouraging result. It indicates that, companies in the sample are experiencing good ERP-driven change and a positive ERP effectiveness. It also indicated that companies are adhering to good project management practices and clearly have a project champion who leads to ensure project success. Non-significant *p values* for *Management Support* and *Team Composition* variables caution companies to pay more attention to these critical success factors of ERP implementation.

Figure 8 summarizes the findings of this study. One hypothesis/relationship proved, one refuted and seven hypotheses undetermined. ERP-driven changes to business processes are significant and the effects of ERP systems are positive. Seven of the critical success factors are being well implemented in the companies and ***Management Support*** and ***Team Composition*** need some attention.

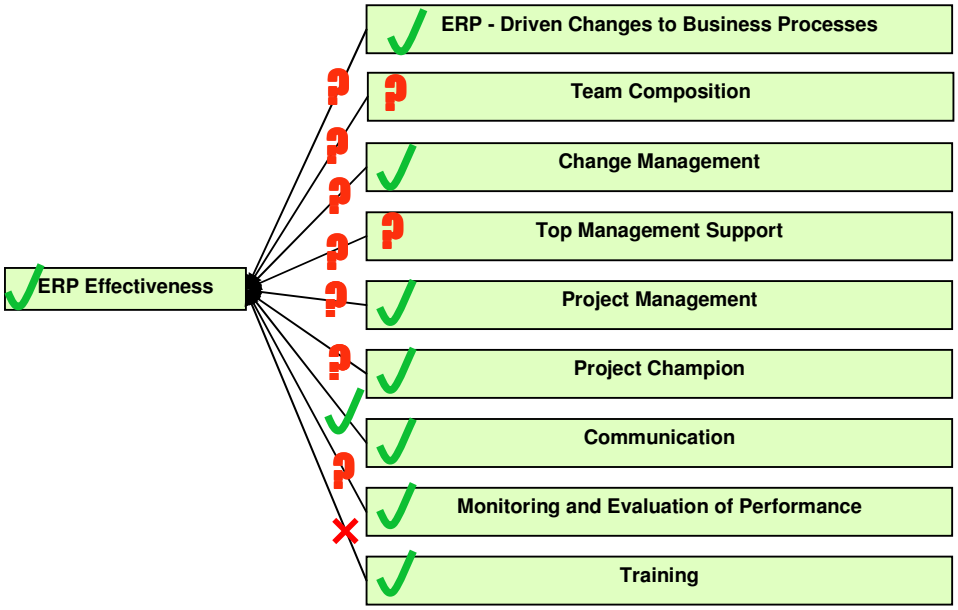

Fig 8. Summary of Findings

7. Conclusion

Enterprise Resource Planning (ERP) systems are packaged, centrally developed and centrally configured systems. For this reason, they are limited in the number of business processes they can model [4, 5] and companies are faced with challenges when their business processes doe not fit those modelled by the relevant ERP system. The predominant view amongst academics and practitioners and in many cases the more cost effective option is to modify company business processes to fit the ERP system [6, 7]. However, an alternative view states that prescribing a one-for-all system may not fit every company's environment and blanket change of all processes to fit the system would be a step toward sub-optimization [4].

Literature sources agree that ERP implementation success depends on focusing on a broad spectrum of change management aspects including strategy, technology, culture, management systems, human resources, and structure [4, 5, 10, 13].

In an attempt to investigate a more nuanced view of business process change, this study included other variables that were likely to influence ERP Effectiveness. ERP Effectiveness was investigated as the effect of ERP systems on business processes at local level. The research hypothesized that ERP-driven Changes in Business Processes are associated with positive ERP Impact and the following independent variables were investigated: ERP Team Composition; Change Management; Top Management Support; Project Management; Project Champion; Communication; Monitoring and Evaluation of Performance and Training. The impact of these variables on ERP impact was tested using Stepwise Multiple Regression analysis. Only Management Support and Team Composition showed

statistically significant impact. However, the study was limited by a relatively low response rate.

Nevertheless, the lack of correlation between ERP-Driven Changes to business processes and ERP Effectiveness cautions practitioners and academics about making blanket recommendations of changing all business processes to fit the ERP system. This definitely deserves further research and validation.

Perhaps the most significant contribution of this research is the development of an accurate instrument. The questionnaire was designed using the *Unified Critical Success* model by Esteves and Pastor [14] and the Critical Success Factors by Nah *et al.* [1], in total encompassing the wisdom of 18 empirical studies on critical success factors of ERP implementation.

The most obvious avenue for future research would be to increase the sample in the hope that a greater number of respondents will yield more interesting results. Also, most of the respondents came from various occupational backgrounds. It might be beneficial to conduct a similar study on a larger scale where it would be possible to cater for occupational differences.

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