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SCHOOL OF COMPUTING AND INFORMATICS

A Work and Organization Based Approach to Assessing Impact of Enterprise Resource Planning Systems [ERPs]

BY

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DECLARATION

This project, as presented in this report, is my original work and has not been presented for any other University award.

15TH JUNE 2009

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This project has been submitted as part fulfillment of requirements for the Masters of Science (Msc.) Information Systems of the University of Nairobi with my approval as the University supervisor.

15/6/2009

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DEDICATION

To my loving wife Veronica, my father Wilson Warui, my mother Joyce Wamuyu and my sisters Carol, Beth, and Kabi.

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The support and encouragement that I received from colleagues and lecturers in the School of Computing and Informatics deserves my special thanks. It is not possible to mention all by name but my sincere gratitude goes to my supervisor Mr. C. Moturi for his scholarly guidance to ensure that this project meets the required standards in partial fulfillment of the Msc programme. Special thanks also go to Mr P. Theuri and Dr W. Ng'ang'a for their review and guidance on finalizing the project.

Special thanks also go to Patrick Kariuki, Steve Wambugu, Veronica Wairimu and Alex Miano who were very instrumental during my data collection in their respective organizations.

ABSTRACT

This study aims at assessing the impact of Enterprise Resource Planning Systems (ERPs) using a work and organization based approach, by studying selected companies in Kenya. The main motivation of this study is the lack of wealth of literature, for evaluating human and organizational implications associated with adopting ERPs in organizations. Enterprise Resource Planning systems are highly complex information systems that have potentially dramatic impacts on many aspects of work and organization.

The study is geared towards assessing the impact of work reorganization brought about by ERP implementation on the individual and consequently on the overall organization. The notion of 'work reorganization' for the purposes of this study denotes change in work organization variables and encompasses the change in control to one's work, job description, the organization hierarchy position and work relationships brought upon an individual as a result of ERP adoption.

The study does not evaluate work reorganization dimension in isolation, rather, it incorporates the other dimensions of Information quality, system quality, individual impact, workgroup impact and organizational impact that have already been validated in previous studies. The study then proceeds to assesses if work reorganization dimension can be incorporated into these existing models brought about by these studies.

This study employs a case study method and draws data using, structured questionnaires and semi structured interviews, from selected companies in Kenya that have implemented ERPs. Descriptive statistics are used to analyze and interpret the results from the various dimensions under study. Structural equation modeling through partial least squares is used in assessing relationships of these dimensions in order to assess whether the work reorganization dimension can be included.

This study came up with five hypotheses which were supported by the results of the data analysis. It emerged that *work reorganization* brought about by ERP is positively related to the *individual impact*. As widely tested and shown in other studies done in the context of other information technology systems and ERPs as well, this study's data analysis also found that *system quality,* in the context of ERP system is positively related to *individual impact.* Also as in other prior studies, the study shows that a relationship exists between *information quality* and *individual impact* and *workgroup impact* and *organizational impact* in that order.

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LIST OF ABBREVIATIONS

ERPs	Enterprise Resource Planning
ES	Expert Systems
IS	Information System
ICT	Information and Communication Technology
IT	Information Technology
PLS	Partial Least Squares
SEM	Structural Equation Modeling

CHAPTER 1

INTRODUCTION

1.0 Background

This study aims at assessing the impact of Enterprise Resource Planning Systems (ERPs) using a work and organization based approach, by studying selected companies in Kenya. The companies selected were those that had comprehensively used ERP to support all their core processes – as opposed to using one module – for at least two years after implementation, so as to enable assessment of impact. Enterprise Resource Planning systems (ERPs) are "packaged business software systems that automate the integration of data across an organization and impose standardized procedures on the input, use and dissemination of that data" (Hall, 2002). ERP has also been defined as a complex business application designed to integrate business processes and functions, and it is capable of presenting a holistic view of business by permitting the sharing of common data and practices in a real-time environment (Al-Mashari, 2003; Davenport, 1998, 2000; Klaus et al. 2000 and Markus and Tanis, 2000).

Work and organization approach to studying ERPs, as Dery et al. (2006) argue, assesses impact ERP have on how work is managed and organized. This dwells on the aspects of organizational structure, staff behavior, individual job designs, team working, information flows, skills, job autonomy, control and other issues related to experience of work that are affected by the adoption of ERPs.

The ERPs implementations, have hugely increased and so capital investments in them such that by 2004 the annual worldwide market for these applications was claimed to have reached $US79 billion annually (Gefen and Ragowsky, 2004). By 2003, it's estimated that 30,000 companies around the world were estimated to have implemented them (Mabert et al. 2003). Initially in the 1990s, ERPs were widely adopted by large companies as replacements for 'legacy' (outdated) information systems (IS) (Esteves and Pastor, 2001) but by 2003, small- and medium-sized firms have largely implemented ERPs (Jacobs and Bendoly, 2003) and for example, by the late 1990s, 60 per cent of small US companies had deployed them (Cissna, 1998).

Previous studies have argued that where ERPs are implemented, they will likely transform the nature, structure and management of work throughout the entire organization (Davenport, 1998; Buckhout et al. 1999; Laughlin, 1999; Trunick, 1999; Koch, 2001b) and that they will have an impact on the day-to-day work and organization-related activities of large numbers of workers globally (Dery et al, 2006). Whereas some studies have dwelled heavily on the accrued benefits that come along with implementing ERPs, other studies have argued that they entail heavy capital expenditure, and often

fail to achieve the intended return on investment. (Martin (1998), Laughlin (1999), Mabert et al. (2001), Stedman's (1999) survey, and Trunick (1999)). As Dery et al. 2006 highlighted in their study, Martin (1998) calculated that 40 per cent of ERP implementations are only partially completed and that between 20 and 50 per cent are scrapped as failures. Laughlin (1999) and Mabert et al. (2001) have estimated that the implementation costs of ERPs are between $US300,000 for small firms and $US500 million for large corporations. Moreover, Stedman's (1999) survey of 63 US companies with ERPs found that their implementation costs exceeded cost savings and revenue gains by an average of $US1.5 million, while Trunick (1999) has observed that between 60 and 90 per cent of implementations fail to achieve the projected return on investment.

This huge significance of ERPs is what has motivated this study to assess the impact their adoption has on day-to-day work of the users and consequently the organization as a whole.

1.1 Problem definition

Irani et al. (2001,2002) note that the pool of techniques available for ICT investments assessment are build around traditional accountancy terms, hence making them inadequate for the evaluation of ICT investments that encompass a range of social and organizational factors, which cannot be accommodated within these frameworks. The lack of wealth of literature for evaluating human and organizational implications associated with adopting ERPs in organizations is the main motivation of this study.

1.1.1 Extending Ifinedo Model: Factoring Work reorganisation

DeLone and Mclean (1992) framework is the most dominant for assessing IT systems success at the micro level and incorporates a range of social and organizational measures (Ifinedo (2006), Livari (2005)). DeLone and Mclean (1992) framework consists of six dimensions of assessing IT systems; *System quality, Information quality, Information use, User satisfaction, Individual impact* and *Organizational impact.* This framework and the evolving of it, is fully illustrated and explained in the literature review section. However, for the purposes of problem definition, this study briefly explains the dimensions of this framework here.

DeLone and Mclean (1992) indicate that in their model *System quality* measures the information processing system itself and dwells on aspects like systems ease of use, reliability, integration among others. *Information quality* measures information system output and dwells on aspects like information accuracy, relevance, importance, usability, availability among others. *Information use* depicts recipient consumption of the output of an information system and dwells on aspects like frequency of use, number of reports, functions used among others. *User satisfaction* depicts recipient

response to the use of the output of an information system. *Individual impact* depicts the effect of information on the behavior of the recipient and dwells on the aspects like benefits to individual tasks, individual productivity, decision making among others. *Organizational impact* depicts the effect of information on organizational performance.

DeLone and Mclean (1992) framework was then extended by Gable et al. (2003) and Ifinedo (2006) in an attempt to make it adequate for ERPs. Gable et al. (2003) through multi-stage data collection and statistical analysis dropped the *information use* and *user satisfaction* dimensions from the D&M model. Ifinedo (2006) extended Gables et al. (2003) work to include the *workgroup impact* dimension after reviewing literature and case studies. Davenport (2000), Klaus et al. (2000) argued that any ERP success measurement model should include a dimension related to workgroup impact because ERP systems are often adopted to enhance efficient cross functional operations.

Ifinedo (2007) investigates the relationships among the ERP systems success dimensions in Ifinedo (2006a) ERP Success Measurement Model using a structural equation modeling (SEM) technique. SEM is a technique that is used to examine relationships among the constructs. Ifinedo (2007) hypothesized paths of Ifinedo (2006a) ERP Success Measurement Model to follow the direction of flow in the DeLone and Mclean (1992) IS success evaluation model as shown in the figure 1 below.

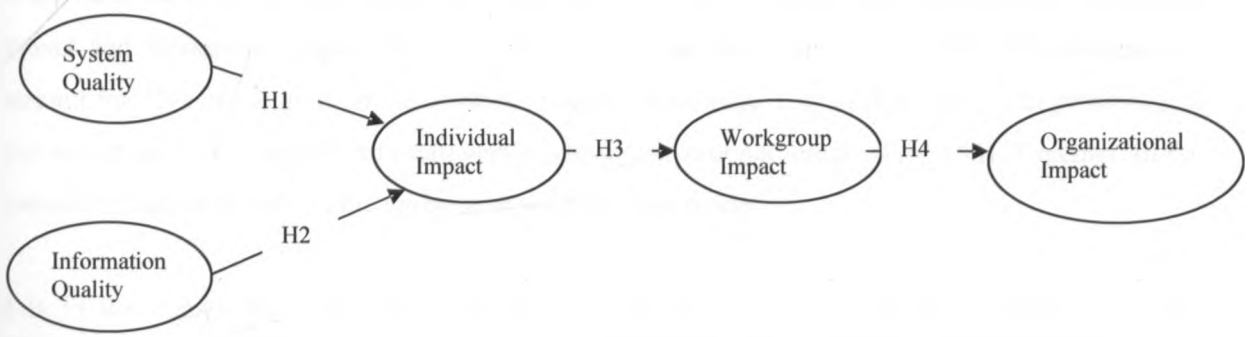


Figure 1: Relationships among paths in the ERP system success model tested by Ifinedo (2007)

Ifinedo (2007) hypothesized that increases in system quality and Information quality will cause increases in Individual impact, and in turn increases in Individual impact will cause increases in workgroup impact whose increases will in turn cause increases in organizational impact. He also hypothesized that increases in Individual impact will cause increases in organizational impact.

Using structural equation modeling (SEM) and employing Partial Least Squares approach the path coefficients, the size of the R^2 results of Ifinedos (2007) analysis are as illustrated below.

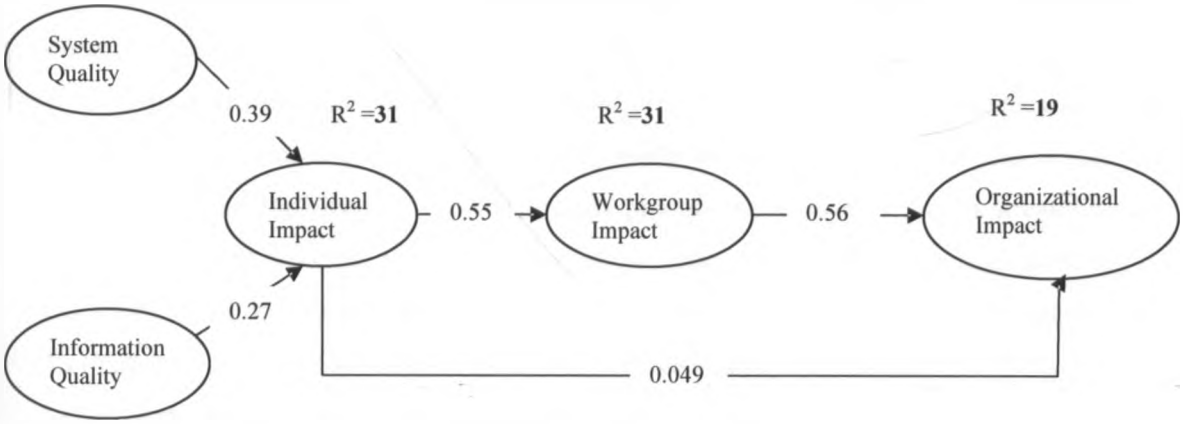


Figure 2: PLS Graph 3.0 Results of the Tested Paths by Ifinedo (2007)

Ifinedo (2007) found that all paths are significant at $p = 0.05$ level with exception of the path between Individual Impact and organizational impact. The study demonstrated that system quality and information quality have strong relationships with the individual impact dimension with path coefficients (β) of 0.39 and 0.27 respectively. The R^2 showed that the two constructs account for 31% in the variation of individual Impact. The study also shows a strong relationships between individual impact and workgroup impact ($\beta = 0.55$) and that individual impact alongside other dimensions account for 31% of variation in the workgroup impact construct. The workgroup impact dimension is also shown to have a significant relationship with organizational impact ($\beta = 0.56$). Together all the constructs explained 19% of the variance in the structural model.

It is in this regard that the study asks the following questions: Are the dimensions of success represented in the Ifinedo (2007) comprehensive? If otherwise, can his model be extended to include any other relevant dimensions? Which dimensions are not covered and may also be included? Going by the argument of DeLone and Mclean (1992), who argued that, it is unlikely that any single, overarching IS success evaluation measure will emerge and advised that a combination of measures are necessary for evaluating IS success, this study thus aims at assessing the impact of work reorganization brought about by ERP implementation on the individual and consequently on the organization as a whole.

This study aims at complementing the work of DeLone and Mclean (1992), Gable et al.(2003) and Ifinedo (2006a) towards the development of a measurement model for ERP systems by incorporating the work reorganization aspect.

1.1.2 Why work reorganization

Implementing ERPs systems frequently requires organizations to change their existing business practices. The major challenge is usually in deciding whether to reengineer business processes and then align the ERPs processes to fit the optimized processes or to reengineer business processes in line with the ERPs processes. In either case this results to work reorganization that impacts on the individuals in these organizations. This is because process re-engineering entails streamlining tasks, job descriptions and reporting lines. Study has shown that whether processes re-engineering occurs before ERPs adoption, business processes are still re-engineered during and after implementation of ERPs (Yakovlev, 2002). It is this element of work reorganization that results from ERPs adoption that this study seeks to incorporate in the existing measurement model of ERPs.

The notion of 'work reorganization' for the purposes of this study denotes change in work organization variables and encompasses, change in control to one's work, change in job description, change in the organization hierarchy position and change in work relationships brought upon an individual as a result of ERP adoption.

The study does not evaluate work reorganization dimension in isolation rather incorporates the other already validated dimensions of Information quality, system quality, individual impact, workgroup impact and organizational impact as well. The study assesses the impact of work reorganization brought about by ERP implementation on the individual and consequently on the organization as a whole and seeks a way of incorporating this dimension into the existing models.

This study draws data from selected companies in Kenya that have implemented ERPs and studies two in manufacturing sector referred to in this study as ManCo1 and ManCo2, one in Service sector referred to in this study as SerCo1 and one in Commodity marketing referred to in this study as ComCo1.

1.2 Objectives of this research

As aforementioned this study aims at complementing the work of DeLone and Mclean (1992), Gable et al.(2003) and Ifinedo (2006a) towards the development of a measurement model for ERP systems by incorporating the work reorganization aspect. Specific objectives are:

- To assess the impact of ERP systems quality on the individual, workgroups and on the overall organization
- To assess the impact of quality of information resulting from ERP systems on the individual, workgroups and on the overall organization

- To assess the impact of work reorganization brought about by ERP implementation on the individual and on the overall organization
- To seek a way of incorporating work reorganization dimension into the existing ERP assessment models.

1.3 Hypotheses of the study

Like Ifinedo (2007) this study hypothesizes that the quality of an ERP system and the information resulting from it will significantly affect an individual in an organization. This individual impact will significantly affect the workgroups and the overall organization .However it seeks to introduce the work reorganization dimension by arguing that it significantly affects the individual impact and consequently the work group and organizational impact of ERP. The summary of the hypothesis for this study is as follows

- H1: Quality of an ERP System significantly affects impact ERPs have on individual
- H2: Quality of Information resulting from ERP systems significantly affects the impact ERPs have on Individual
- H3: Work reorganization resulting from adoption of ERP systems significantly affects impact ERPs have on Individual
- H4: Impact of ERPs on Individual significantly affects Impact ERPs have on the Workgroups
- H5: Impact of ERPs on workgroups significantly affects the overall Impact ERPs have on the organization

In this regard the study proposes to extend ifinedo's model as follows

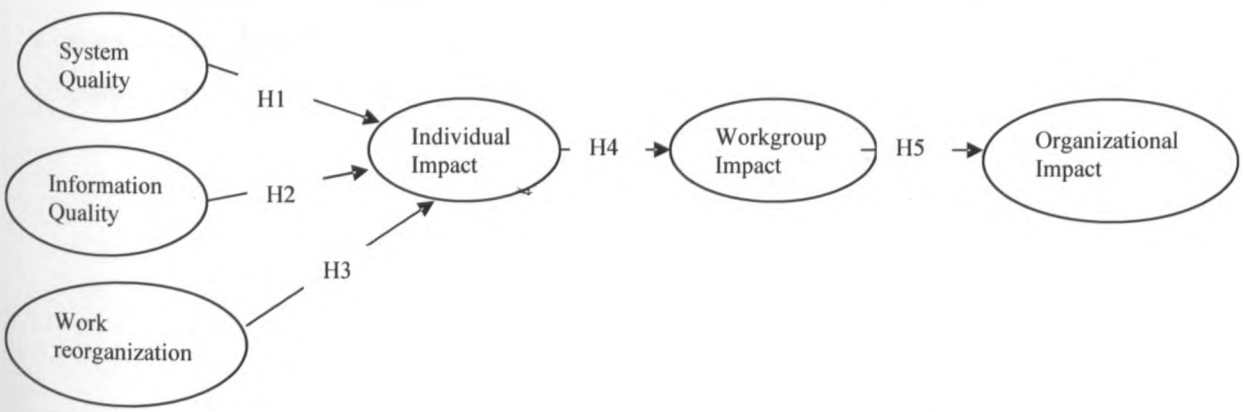


Figure 3: Extension of ERP system success model tested by Ifinedo (2007)

1.4 Project justification

The ERPs implementations, have hugely increased and so capital investments in them such that by 2004 the annual worldwide market for these applications was claimed to have reached $US79 billion annually (Gefen and Ragowsky, 2004). By 2003, it's estimated that 30,000 companies around the world were estimated to have implemented them (Mabert et al., 2003). During this study, an interview with one of the vendors of ERPs revealed that, in Africa there are more than 400 companies that have adopted ERPs. It was also estimated that in Kenya more than 10 companies are comprehensively using ERPs with more than 20 others using one of the modules of an ERP. Laughlin (1999) and Mabert et al. (2001) have estimated that the implementation costs of ERPs are between $US300, 000 for small firms and $US500 million for large corporations and making the investment of ERPs in Kenya huge.

Previous studies have argued that where ERPs are implemented, they will likely transform the nature, structure and management of work throughout the entire organisation (Davenport, 1998; Buckhout et al., 1999; Laughlin, 1999; Trunick, 1999; Koch, 2001b) and that they will have an impact on the day-to-day work and organisation-related activities of large numbers of workers globally (Dery et al., 2006). Whereas some studies have dwelled heavily on the accrued benefits that come along with implementing ERPs, other studies have argued that they entail heavy capital expenditure, and often fail to achieve the intended return on investment. (Martin (1998), Laughlin (1999), Mabert et al. (2001), Stedman's (1999) survey, and Trunick (1999)).

This study is motivated by the huge significant investments organizations are making in ERPs in Kenya and the potential that ERPs have to touch on every-day working lives of large numbers of workers. It thus aims at assessing the human, work and organizational implications brought about by adopting ERPs.

CHAPTER 2

LITERATURE REVIEW

2.0 ERPs defined

Enterprise Resource Planning systems (ERPs) are packaged business software systems that automate the integration of data across an organization (and, indeed, among organizations), impose standardized procedures on the input, use and dissemination of that data and also include modules that are able to facilitate the analysis of that data and information in support of various decision making, analytical and management functions. (Dery et al. 2006)

In a technical aspect ERP systems are based on a client/server architecture providing support to integrated business processes across organizational functions (Carton et al. 2003). ERPs have also been defined as a set of customizable and highly integrative real time business application software modules sharing a common database, which support core business, production and administrative functions, such as logistics, manufacturing, sales, distribution, finance and accounting.(Stefanou 2000). Sammon et al. (2003) said "*ERP systems are integrated enterprise-wide software packages that use a modular structure to support a broad spectrum of key operational areas of the organization*".

ERP systems provide better access to management information regarding companies' transactions for instance actual sales and cost of sales thus coming up as transactional backbone of an organization (Carton et al. 2003). Holland et al. (1999) and Kalakota and Robinson (1999) argue that challenges posed by portfolios of "disconnected, uncoordinated applications that have outlived their usefulness" (legacy systems) have popularized ERPs since ERPs appear to solve them. Studies have previously argued that ERPs are implemented mainly by multi-site and multinational companies since they integrate business information, manage resources, accommodate diverse business practices and organizational processes (Wood and Caldas, 1999; Carton et al. 2003).

Having spread localized and distinct information units, each located in different locations e.g. in a subsidiary which collect and store their own data, impacts greatly on productivity due to the workload of rekeying, reformatting, updating, debugging, etc and often leads to management using instinct more than sound business rationale in decision making (Davenport, 1998 and Carton et al. 2003). Bingi et al. (1999) and Horwitt, (1998) argue ERP systems can be used to provide a "common language" between subsidiaries. This is because ERP systems allow sharing of information in standard format across departments, currencies, languages and national borders and this in a way integrates remote subsidiaries in a common corporate practice (Carton et al. 2003).

Carton et al. (2003) list some of the benefits achieved by companies looking to harness the tight global coordination afforded by ERP systems as:

- Streamlining global financial and administrative processes
- Global lean production model
- Rapid shifting of sourcing, manufacturing, and distribution functions worldwide in response to changing patterns in supply and demand or to changing local cost bases
- Minimize excess manufacturing capacity
- Reduce component and finished goods inventory

Davenport (1998) describes how Owens Corning, for example, adopted ES to replace 211 legacy systems in an effort to co-ordinate order-management, financial reporting, and supply chain processes across the world. This new global procurement set up enabled the company to, enter into larger more advantageous international contracts for supplies, track finished goods inventory daily, both in company warehouses and in the distribution channel, and spare parts inventory was reduced by 50%. The company expected to save $65 million as a result of the adoption of these globally coordinated processes.

2.1 Impacts of ERP on the organization

> "Much of today's research in the area of organizational learning and knowledge management deals with the difficulties of creating and harnessing the value inherent in employees know-how and ways of doing business. This begs the question as to why so many companies are willing to throw out what they have learned in favour of practices they know nothing about. And, when they do so, what evidence is there to suggest that companies do achieve their stated aims of improved efficiency by adopting these industry best practices? Indeed, no organization plans to "brutalize" its personnel by implementing a Big Brother style control systems that don't let a single expenditure go unnoticed. However, it is clear that there is little to prepare employees for the changes in the organization of their day to day work and sources of support."
>
> Carton et al. (2003)

Davenport (1998) viewed impact of ERP on company's organization and culture on two aspects. On one aspect, ERPs allow companies to streamline their management structures, creating flatter, and more flexible organizations by providing universal, real-time access to operating and financial data. On the other aspect Davenport (1998) argued that ERPs also involve the centralization of control over information and the standardization of processes, which are qualities more consistent with hierarchical, command and control organizations with uniform cultures. Whereas previously

information was sought from colleagues, ERPs that now entail tracking every detail of transactions, introduce a "de-humanizing" element in an organization with information now being sought from the system (Carton et al. 2003).

Davenport (1998) asks, for a multinational, how much uniformity should exist in the way it does business in different regions or countries? Given the differences in regional markets strict process uniformity such as the one brought about by ERPs can be counterproductive in most vast companies and thus there is need for companies to remain flexible and allow regional units to tailor their operations to local customer requirements and regulatory structures (Carton et al. 2003). Davenport (1998) recommends an approach taken up Monsanto, Hewlett-Packard and Nescafe companies where different versions of the same system are rolled out to each regional unit. Horwitt (1998) argues that this now leads to the difficult decision companies have to make in deciding on what aspects of the system need to uniform and what aspects can be allowed to vary.

Carton et al. (2003) argue that organizational culture affects implementations of ERPs citing that in Europe, ERP projects are more complex than in North America, because of diverse national cultures which influence organizational culture. Krumbholz (2001) add that failure to adapt packages to fit the national culture leads to projects, which are expensive and late. Thus, multi-nationals face a choice between using their ERP as a standardization tool or preserving (rather tolerating) some degree of local independence in software terms (Davenport, 1998).

Carton et al. (2003) look at the analysis by Ward & Griffiths (1996) which looks at the models that have been used to present these conflicting forces of control and flexibility (in the context of IS planning), and within which organizations must attempt to steer the best path. Among the various approaches to IT planning that Ward & Griffiths discuss is the Infusion / Diffusion model proposed by Sullivan (1985). Using this model shown below,

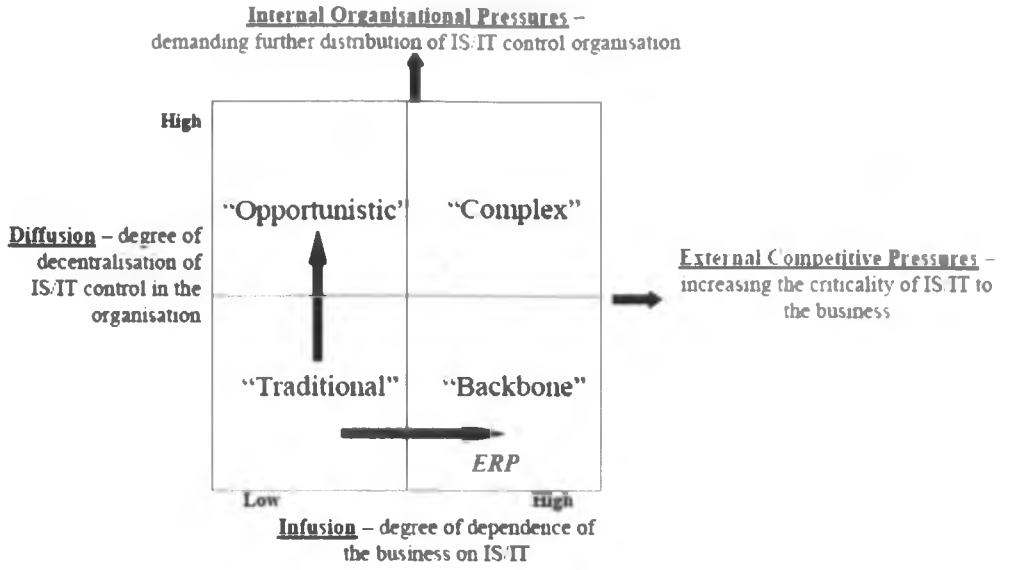


Figure 4: Environments of IS / IT planning (Sullivan, 1985) in Ward & Griffiths (1996) and also in Carton et al. (2003)

Firstly, *infusion* is the degree to which an organization becomes dependent on IS/IT to carry out its core operations and manage the business. *Diffusion*, on the other hand, is defined as the degree to which IT has become dispersed throughout the organization and decisions concerning its use are decentralized. Carton et al. (2003) argue that these two aspects reflect the "opposing" forces of automation in industry:

1. creating advantage from tools by working with them close to the point of application (possibly inventing new and unforeseen uses of tools depending on immediate business need) : this emphasizes the notion of *effectiveness*
2. keeping control of resources and skills so that the benefits of automation can be shared throughout the organization : this emphasizes the notion of *efficiency*

Carton et al. (2003) further point out that ERP is considered *low diffusion* because it is by nature a centralizing force in the organization, often chosen to consolidate disparate legacy systems and standardize across variations in business practice. It is *high infusion* because it has the effect of spreading the threads of integration across the business functions.

Carton et al. (2003) depict the evolution of the use of information systems in the organization and argue that ERP systems may be depicted as a function of the drive to integrate ever greater business functionality and the drive to control the means of delivery of this functionality.

2.2 Human and Organizational dimension to Evaluation of Integrating Technologies: Evolving of various models

The evaluation of ICT investments has not been focusing on the human and organizational aspects. (Irani et al. 2005). Many organizations use 'traditional' appraisal techniques, such as Return on Investment (ROI), Return on Capital Employed (ROCE) and Cost-Benefit Analysis (CBA) regardless of their limitations (Ballantine & Stray, 1999; Remenyi et al. 2000).

Dery et al. (2006) note that ERPs are highly complex information systems that have potentially dramatic impacts on many aspects of work and organization. They also note that in keeping up with the difficulty and complexity of implementing these systems, the main focus of ERP literature has been on the process of implementation. They also highlight that even when successfully implemented, ERPs often fail to deliver the organizational benefits that are anticipated.

In the review of literature, this study notes that previous studies have come up with various measures of IT systems success factors and woven them into models. The Ifinedo (2006) and Livari (2005) point out that the most dominant framework for assessing IT systems success at the micro level incorporating a range of social and organizational factors is that developed by DeLone and Mclean, (1992). The models is illustrated in the figure 5 below

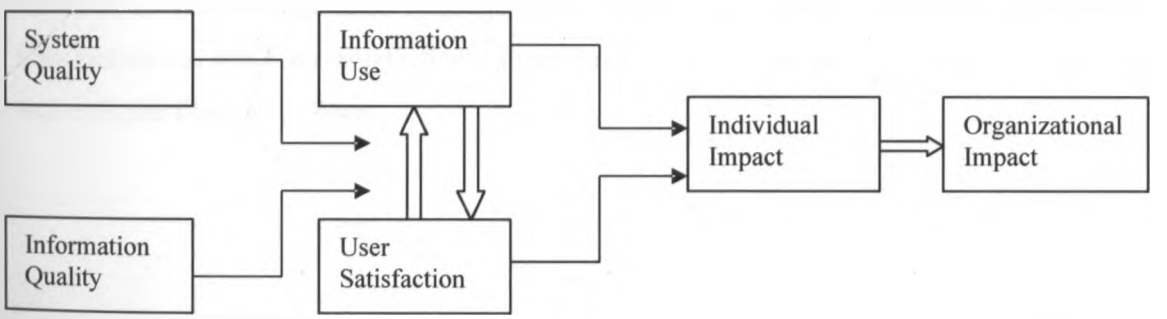


Figure 5: DeLone and Mclean(D&M), (1992) IS success evaluation model

DeLone and Mclean, (1992) indicate that in their model *System Quality* measures of the information processing system itself, *Information quality* measures of information system output, *Information use* depicts recipient consumption of the output of an information system, *User satisfaction* depicts recipient response to the use of the output of an information system, *Individual impact* depicts the effect of information on the behavior of the recipient and *Organizational impact* depicts the effect of information on organizational performance. They showed and argued in their study that *system quality* and *information quality* singularly and jointly affect both *information use* and *user satisfaction*. Also pointed out that the amount of *information use* can affect the degree of *user satisfaction* – positively or negatively – as well as the reverse being true. They also argued that

information use and *user satisfaction* are direct antecedents of *individual impact* and that this impact on individual performance should eventually have some *organizational impact*.

DeLone and Mclean, (1992) point out that an I/S model, consisting of these six interdependent constructs, implies that a measurement instrument of "overall success" based on items arbitrarily selected from the six I/S success categories is likely to be problematic and researchers should systematically combine individual measures from the I/S success categories to create comprehensive measurement instrument.

Drawing from the work of DeLone and Mclean, (1992), Gable et al.(2003) developed an additive ERP systems success measurement model that redefines the dimensions in the original DeLone and Mclean IS success model, (1992). The argument for the new ERP model was based on that of DeLone (1992) that specific characteristics of the IT system under investigation should be taken into account, when evaluating its success. Most literature shows that ERP systems differ from other IT systems since it includes technological, operational, managerial, strategic and organizational components (Davenport (1998, 2000), Klaus et al. (2000), Kraemer et al. (1993)) and thus Gable et al. (2003), Ifinedo (2006) and Livari (2005) argue that success measurement models used for other typical IT systems evaluation may not be adequate for ERP systems. In coming up with their model Gable et al. (2003) eliminated (through multi –stage data collection and statistical analysis) the Information use and User satisfaction dimensions in the DeLone and Mclean model. They came up with a model illustrated below

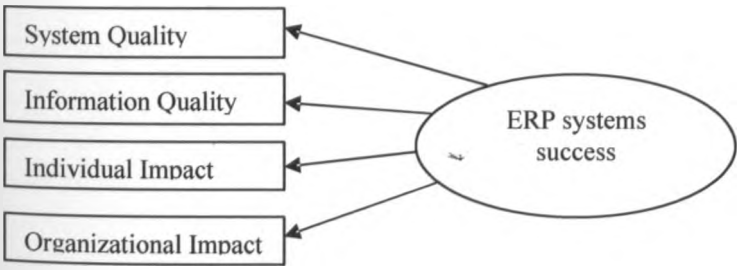


Figure 6: Gable et al.,(2003) ERP Success Measurement

Ifinedo (2006a) proposed an extended ERP system success measurement model to include *workgroup impact* after reviewing literature and case studies. They argued that any ERP success measurement model should include a dimension related to workgroup impact because ERP systems are often adopted to enhance efficient cross functional operations (Davenport, (2000), Klaus et al. (2000)).

Ifinedo (2006a) referred to workgroup as the sub-units and/or functional departments of an organization. Infinedo's (2006a) model is illustrated below.

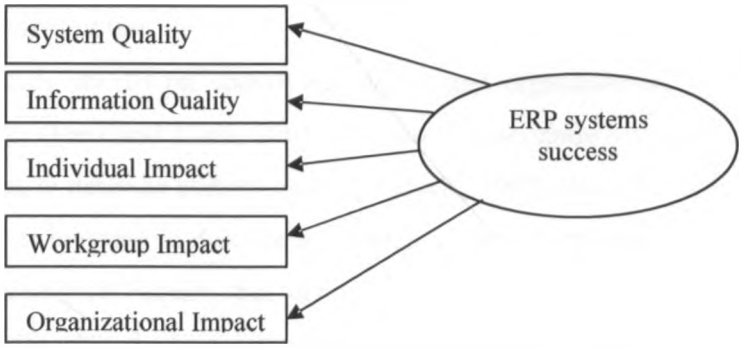


Figure 7: Ifinedo (2006a) ERP Success Measurement Model

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

This study dwells on underlying human and organizational issues and thus employs case study research (Irani and Love, 2001).The term "case study" is used in this study both in terms of its meaning to describe units of analysis (Myers, 1997) since the study is a case study of four companies and in its meaning to describe a research method. In the latter aspect, this study defines a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2002). This study also strives to employ both qualitative and quantitative research approach where it starts by consulting relevant literature and then conducting case study research.

Benbasat et al. (1987) argues that the case study research method is particularly well-suited to IS research in organization when interest of the study is on organizational rather than technical issues.

3.1 The Population

This research covers four companies in Kenya, two in manufacturing, one in service and one in commodity sector which have deployed ERPs. The companies selected were those that had comprehensively used ERP to support all their core processes – as opposed to using one module – for at least two years after implementation, so as to enable assessment of impact

3.2 Sampling

3.2.1 Sampling Method

The sampling methods used were:

- *Judgmental sampling:* The sample selected was based on judgment and the chosen sample to a good degree was truly representative of the entire population.
- *Convenience sampling:* This non-random sampling method was used for this exploratory research since the study aims at getting inexpensive approximation of the truth and this method is suited for getting gross estimate of the results during the preliminary study without incurring the cost or time required to select a random sample.

3.2.2 Sample and sample justification Sub Sample Size

The sample consists of four companies in Kenya, two in manufacturing, one in service and one in commodity sector which have deployed ERPs. Within this sample the study then gets three sub-samples. The first group consisted of senior managers and key members who were in the ERP implementation team at the four companies. This was so as to gain insight into the companies'

objectives behind the implementation of ERP as well as how the implementation experience was. This is also aimed at providing the nature of the 'technological artefact' (in this case as 'technological artefact' notion is used by (Orlikowski, 2000) to describe the apparently material object that is seen to be constituted of particular materials and to be inscribed with particular assumptions associated with its design.), which users in the organization would enact and also the organizational context shaping users' beliefs and expectations.

The second group consisted of "power users," or intensive users, who were selected individuals from the departments of Disbursements, Accounting, Customer Accounts, Purchasing, Contract Management, and Budget. Power users are centrally involved in ERPs processing, in that all most transactions especially having financial implications eventually pass through their hands

The third group consisted of people the study chose to call 'regular users' who were selected individuals from all other units were who regularly interact with the ERPs in one way or the other in their line of work e.g. data entry associated with financial, transactions such as purchase requisitions, travel authorizations, express vouchers, consultant agreements, petty cash advances, and reimbursements.

This was aimed at providing insight on the impact from the power users and regular users, that is, ways in which they use ERPs generally and also in relation to other sources of information, their thoughts on the value of the system for the effective management of their department, and the ways in which the system may have impacted their roles in their departments.

Across the samples the study through judgmental sampling ensures representation of senior management, middle management and non management staff. The matrix below depicts the sampling and data collection plan.

Table 1: Distribution of respondents by company, user group and position in the organization

Company	Company Nature of Business	Level in Hierarchy	No of interviewees and Types of Users		
			Staff in the implementation committee	Power users	Regular users (users)
ManCo1	Manufacturing	Senior Management	1		
		Middle management	3	4	
		Non management	3	8	10
		TOTAL	**7**	**12**	**10**
ManCo2	Manufacturing	Senior Management			
		Middle management	1	2	
		Non management		2	4
		TOTAL	**1**	**4**	**4**
ServiceCo2	Service Industry	Senior Management	1		
		Middle management	3	6	
		Non management	3	6	11
		TOTAL	**7**	**12**	**11**
Commodity Co2	commodity Industry	Senior Management			
		Middle management	2	7	
		Non management	2	5	9
		TOTAL	**4**	**12**	**9**
		GRAND TOTAL	**19**	**40**	**34**

3.3 Data Collection methods

This study employed structured questionnaires and semi structured interviews for data collection. The study also called on secondary data. The questionnaire used a 7-point Likert-type scale, where 1=strongly disagree and 7= strongly agree. The questionnaire also had an open section to enable further elaboration. The commercial confidentiality nature of the data on the ERP systems in these organizations did not permit the direct participant observation evident in much 'situated' research of technology in organization. However, the comprehensive questionnaire, the semi-structured interviews with some of the users and secondary data provided insight into experiences, beliefs, habits, power structures and norms that have shaped the behaviors and use of technology. While it is acknowledged that the absence of first hand observations, and thus the reliance on self-reported behavior, may have some limitations, the richness of the data combined with the multiplicity of methods adds considerable value to this analysis.

To ensure the reliability of our questionnaire, the measures and constructs in it have been validated in the literature reviewed (Ifinedo and Nahar, 2006; Sedera and Gable, 2004; Sedera et al. 2003 and Gable et al. 2003). As aforementioned this study aims at extending the Ifinedo (2006) model by assessing the impact of work reorganization brought about by ERP implementation on the individual and consequently on the organization as a whole.

The study employed the dimensions and measures shown in the table below (Ifinedo (2006), Ifinedo and Nahar, 2006; Sedera and Gable, 2004; Sedera et al. 2003 and Gable et al. 2003) and as recommended (Chin, 1998 and Nunnally, 1978) the Cronbach Alpha for each dimension is above the 0.70. Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency) and measures how well a set of items (or variables) measures a single unidimensional latent construct (Chin, 1998 and Nunnally, 1978). Full table is shown in the data analysis section.

Table 2: ERP Systems Success Dimensions and Reliability

Dimension	No. of measures	Cronbach Alpha	Examples of questions in the instrument
System Quality	11	0.9315	"Our ERP is easy to use." "Our ERP is reliable."
Information Quality	8	0.9524	"The information on our ERP is understandable." "The information on our ERP is relevant."
Work reorganisation	5	0.9667	"Our ERP makes me lose control of my work." "Our ERP resulted in change of my job description"
Individual Impact	6	0.9647	"Our ERP improves individual productivity." "Our ERP is beneficial for individual's tasks."
Workgroup Impact	7	0.9346	"Our ERP helps to improve workers' participation in the organization."
Organizational Impact	8	0.9644	"Our ERP reduces organizational costs." "Our ERP increases customer service/satisfaction."

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

4.0 Introduction

The data was analyzed using SPSS 11.5 and SmartPLS 2.0 (Ringle et al. 2005). The study sought to assess the impact of ERPs among selected companies in Kenya. Data was collected through structured questionnaires with both open and closed ended questions from the survey respondents. Data editing and reconciliation were undertaken before any data analysis was done. This was essential to avoid using incoherent data which could lead to reaching or making wrong conclusions and drawing wrong inferences.

The data is organized in six dimensions namely *system quality, information quality, work reorganization, individual impact, workgroup impact and organizational impact.* The study does data analysis in three facets. First the study employs descriptive analysis to assess each of the six dimensions.

Secondly, this study examines the relationship between the six dimensions; *system quality, information quality, work reorganization, individual impact, workgroup impact and organizational impact* using Chi-square test and Kendall tau *b* statistic, by hypothesizing the paths to follow the *DeLone* and Mclean , (1992) IS success evaluation model as shown in the figure below.

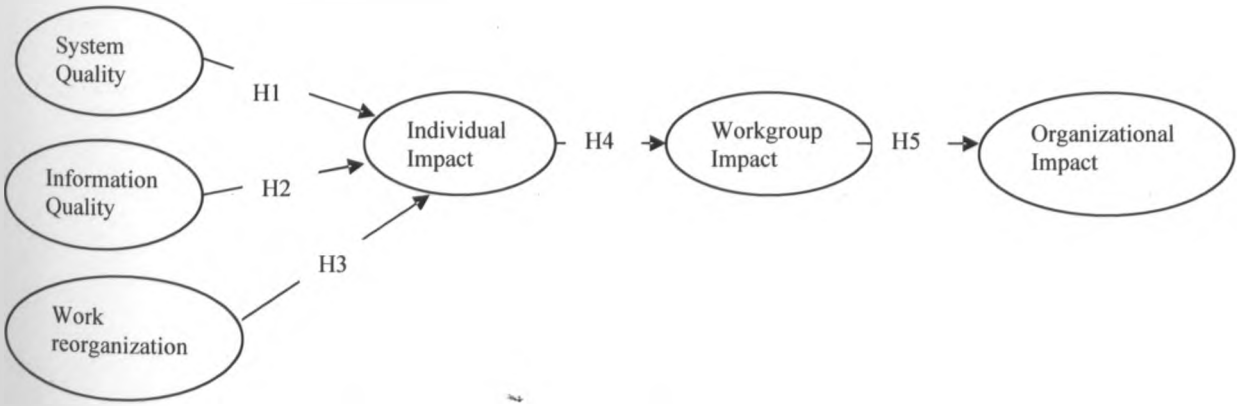


Figure 8: Hypothesis of this study

Using SPSS cross tabulation the study employs Chi-square test to assess the relationship between the measures of these dimensions and Kendall tau *b* statistic to assess the strength of the relationships owing to the ordinal nature of the data. Kendall tau *b* test ranges from -1 to +1, with the sign telling

the direction of the relationship. Minus means that as one increases the other decreases and plus means that as one goes up so does the other and the closer to +1 or -1 the stronger the relationship.

After assessing the relationships between the measures in these dimensions, guided by Ifinedo (2007), this study then investigates the relationships among the ERP systems success dimensions in Ifinedo (2006a) ERP Success Measurement Model using a structural equation modeling (SEM) technique. SEM is a technique that is used to examine relationships among the constructs.

Table 3 shows the measures under each dimension and their composite reliabilities and the Cronbach alphas measures of validity. Cronbach Alpha is a coefficient of reliability (or consistency) and is recommended to be above the 0.70 for each dimension (Chin, 1998 and Nunnally, 1978) a condition this study fulfils. Composite reliability is a measure of the overall reliability of a collection of heterogeneous but similar items. The composite reliability of each dimension in this study are system quality – 0.94, information quality – 0.96, work reorganization – 0.97, individual impact – 0.96, workgroup impact – 0.95, and organizational impact – 0.97 which is adequate for a study such as this one (Hair et.al, 1998).

Table 3: Measures, Cronbach alphas, and construct reliability

No.	/Dimension	Measures in questionnaire	Number of measures	Cronbach alpha	Composite reliability
1.	**System Quality dimension**	Our ERP has accurate data	11	0.9315	0.9464
2.		Our ERP is flexible			
3.		Our ERP is easy to use			
4.		Our ERP is easy to learn			
5.		Our ERP is reliable			
6.		Our ERP allows data integration			
7.		Our ERP allows for customization			
8.		Our ERP is efficient			
9.		Our ERP has good features			
10.		Our ERP allows for integration with other IT systems			
11.		Our ERP meets users' requirements			
12.	**Information Quality dimension**	Our ERP database contents is up-to-date	8	0.9524	0.9601
13.		Our ERP has timely information			
14.		The information on our ERP is understandable			
15.		The information on our ERP is important			
16.		The information on our ERP is brief			
17.		The information on our ERP is relevant			
18.		The information on our ERP is usable			
19.		The information on our ERP is available			
20.	**Work Reorganization dimension**	ERP implementation resulted in loss of control of day to day aspects of my work	5	0.9667	0.9721
21.		ERP implementation reduced frequency of interaction with my colleagues			
22.		ERP implementation led to change of my job description			
23.		ERP implementation led to change of my position in the organization structure			
24.		ERP implementation led to change to my lines of reporting			
25.	**Individual Impact dimension**	Our ERP enhances individual creativity	6	0.9647	0.9690
26.		Our ERP enhances organizational learning and recall for individual worker			
27.		Our ERP improves individual productivity			
28.		Our ERP is beneficial for individual's tasks			
29.		Our ERP enhances higher-quality of decision making			
30.		Our ERP saves time for individual tasks and duties			
31.	**Workgroup Impact dimension**	Our ERP helps to improve workers' participation in the organization	7	0.9346	0.9508
32.		Our ERP improves organizational-wide communication			
33.		Our ERP improves inter-departmental coordination			
34.		Our ERP creates a sense of responsibility			
35.		Our ERP improves the efficiency of sub-units in the organization			
36.		Our ERP improves work-groups productivity			
37.		Our ERP enhances solution effectiveness			
38.	**Organizational Impact dimension**	Our ERP reduces organizational costs	8	0.9644	0.9705
39.		Our ERP improves overall productivity			
40.		Our ERP enables e-business / e-commerce			
41.		Our ERP provides us with competitive advantage			
42.		Our ERP increases customer service/ satisfaction			
43.		Our ERP facilitates business process change			
44.		Our ERP supports decision making			
45.		Our ERP allows for better use of organizational data resource			

4.1 Distribution of Responding Companies and user groups

The distribution of the respondents was between four companies with 31% of them being employees of Manco1, 31% of Serco1, 9% of Manco2 and 26% of commco1. Regular users of ERPs were 35% of all respondents, 42% were power users and 20% were users who had been involved in the implementation. Distribution of respondents by company and user groups is shown in tables 3, 4 and 5.

Table 4: Distribution of respondent by company

	Frequency	Percent	Cumulative Percent
Manco1	29	30.2	31.2
serco1	30	31.3	63.4
Manco2	9	9.4	73.1
commco1	25	26.0	100.0
Total	93	100.0	

Table 5: Distribution of respondent by user groups

	Frequency	Percent	Cumulative Percent
regular user	34	35.4	36.6
power user	40	41.7	79.6
implementing group	19	19.8	100.0
Total	93	96.9	
Total	93	100.0	

Table 6: Company vs. User group Cross tabulation

		USER GROUP			
		regular user	power user	implementing group	Total
COMPANY	Manco1	10	12	7	29
	serco1	11	12	7	30
	Manco2	4	4	1	9
	commco1	9	12	4	25
Total		34	40	19	93

4.2 Descriptive analysis by each dimension

4.2.1 System quality dimension

More than 50% of the respondents agree that ERPs is reliable, efficient, easy to use, has accurate data and has features which are useful to their work. The study also shows that ERPs allows for data

integration with more than 80% of the respondents attesting to this. With ERP system, all data is centralized. However, more than 50% of the respondents expressed the inflexibility of the system in that, it allows for customization but the process of doing so is resource straining making people at times have to adapt to the systems processes.

More than 60% of the respondents consider the process of learning of how to use the system rigorous and difficult. Most of these respondents cite one needs to have more than basic computer skills and completely understand the operations of the company to be able to utilize the system effectively. Also the ERP adoption had resulted to change in some of the manual processes thus requiring staff to learn the new processes. Table 6 and figures 8-18 show the descriptive data of the system quality dimension.

Table 7: Descriptive Statistics for system quality dimension (spss 11.5 extract)

	N	Minimum	Maximum	Mean
Our ERP has accurate data	93	3.00	7.00	5.6774
Our ERP is flexible	93	2.00	6.00	3.0538
Our ERP is easy to use	93	3.00	7.00	5.1935
Our ERP is easy to learn	93	2.00	6.00	3.6989
Our ERP is reliable	93	3.00	7.00	5.3871
Our ERP allows data integration	93	5.00	7.00	5.8172
Our ERP allows for customization	93	2.00	5.00	3.6559
Our ERP is efficient	93	3.00	7.00	5.5269
Our ERP has good features	93	3.00	7.00	5.3978
Our ERP allows for integration with other IT systems	93	2.00	6.00	4.2581
Our ERP meets users' requirements	93	2.00	6.00	4.9247
Valid N (listwise)	93			

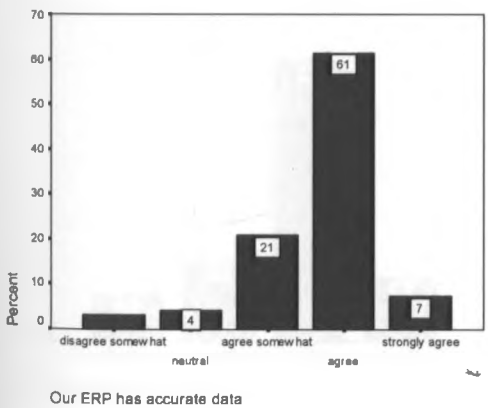


Figure 9: ERP accuracy

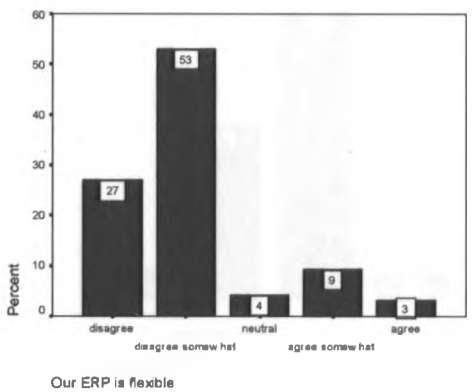


Figure 10: ERP Flexibility

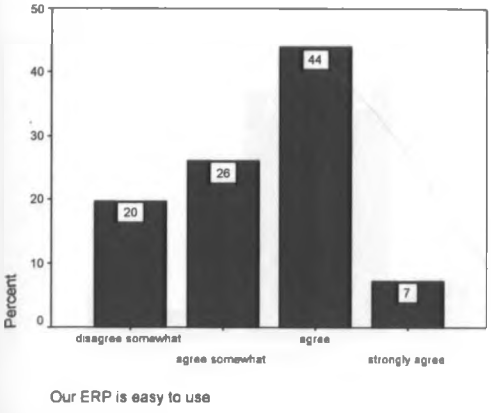


Figure 11: ERP Ease of use

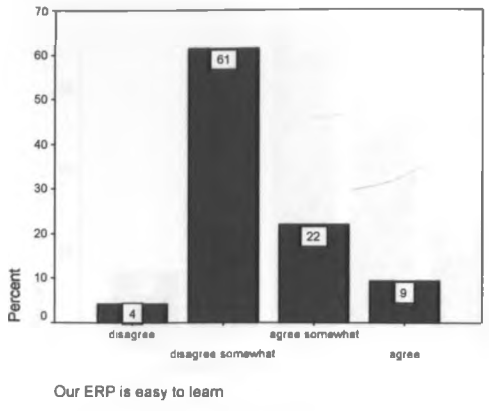


Figure 12: ERP ease to learn

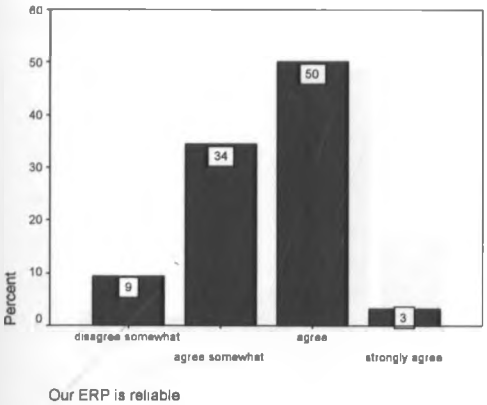


Figure 13: ERP reliability

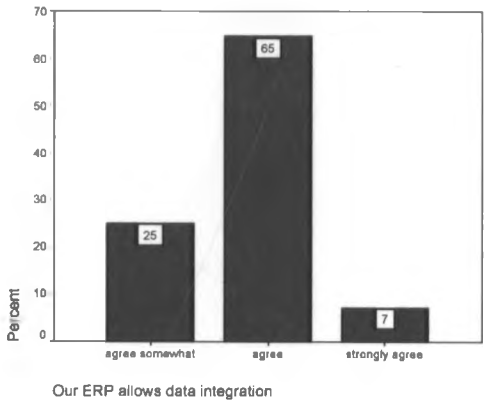


Figure 14: ERP data integration

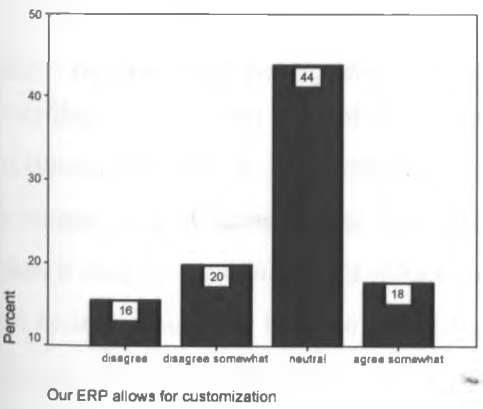


Figure 15: ERP customization

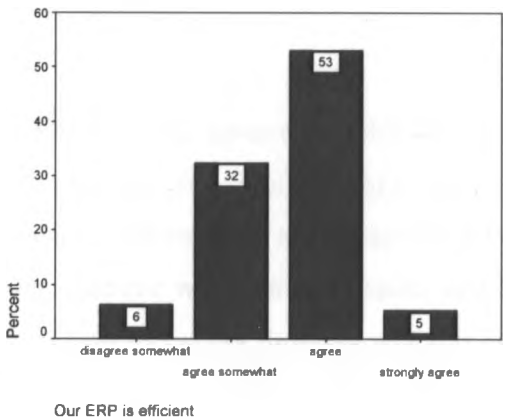


Figure 16: ERP efficiency

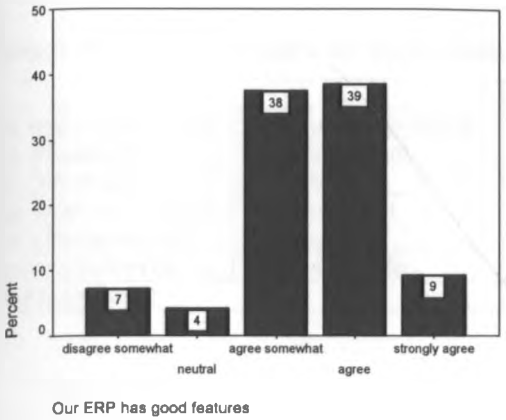


Figure 17: ERP features

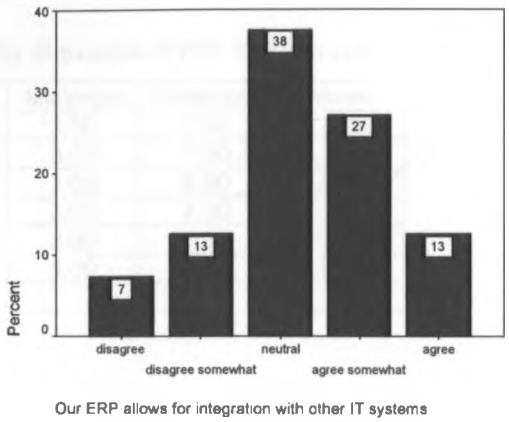


Figure 18: ERP integration with other IT systems

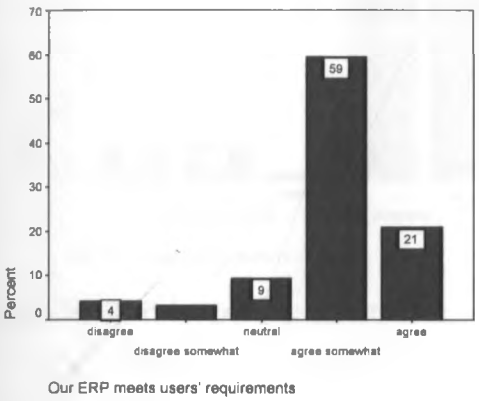


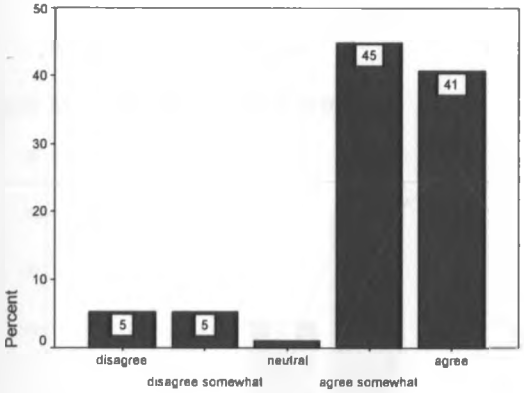
Figure 19: ERP and user requirements

4.2.2 Information quality dimension

According to more than 70% of the respondents, ERP provides up-to-date, relevant, understandable and timely information. Most respondents felt that ERP was very useful to their work compared to the manual way of doing things. Accessing information one needs is also easier in ERP and it also makes it easy to manipulate this information to get what one wants through reports and information dash boards. This is so because the system has a central repository database which is accessible to everyone depending on the access rights i.e. *one point of data entry-many points of data manipulation.* Table 7 and figures 19-26 show the descriptive data of the information quality dimension.

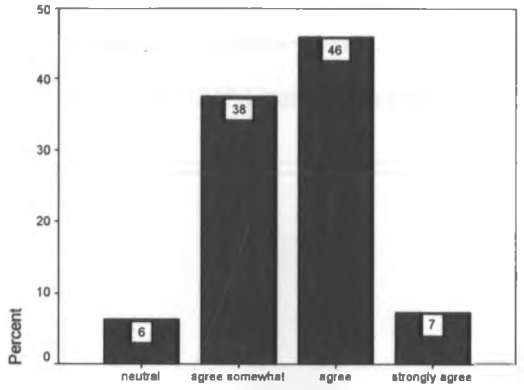
Table 8: Descriptive Statistics for information quality dimension (SPSS 11.5 extract)

	N	Minimum	Maximum	Mean
The information on our ERP is understandable	93	3.00	7.00	5.3763
The information on our ERP is important	93	3.00	7.00	5.2688
The information on our ERP is brief	93	2.00	6.00	4.9247
The information on our ERP is relevant	93	3.00	7.00	5.7312
The information on our ERP is usable	93	3.00	7.00	5.7312
The information on our ERP is available	93	5.00	7.00	5.8710
Valid N (listwise)	93			



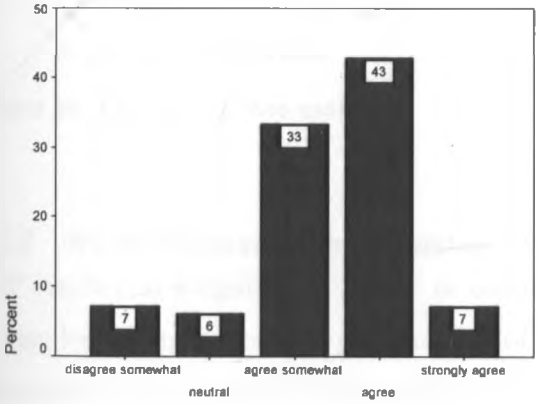
Our ERP database contents is up-to-date

Figure 20: ERP database up-to-date



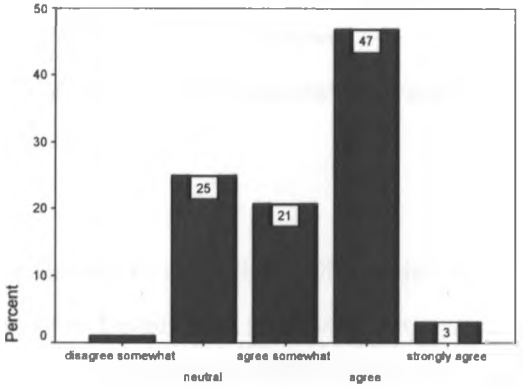
Our ERP has timely information

Figure 21: ERP information timeliness



The information on our ERP is understandable

Figure 22: ERP information understandability



The information on our ERP is important

Figure 23: ERP information importance

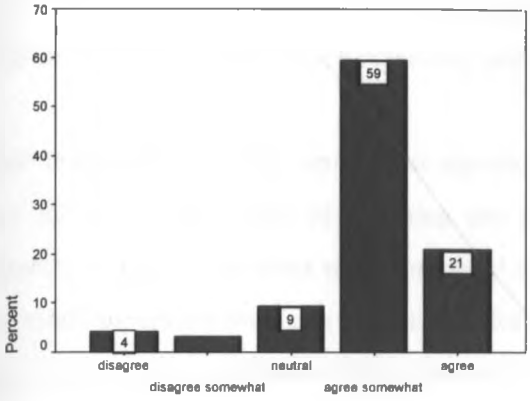


Figure 24: ERP information briefness

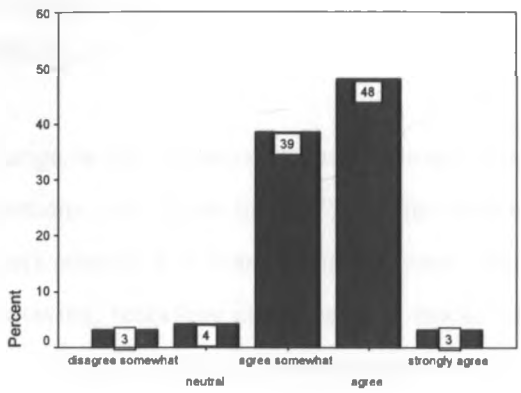


Figure 25: ERP information relevance

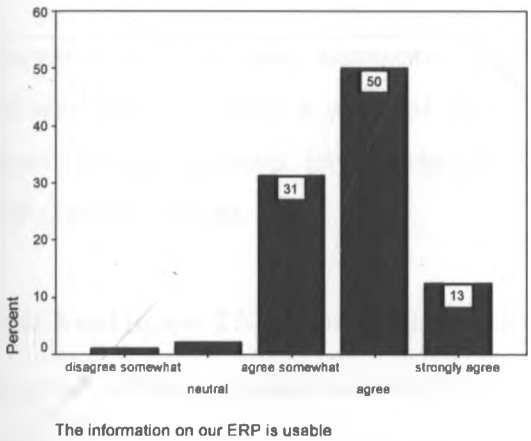


Figure 26: ERP information usability

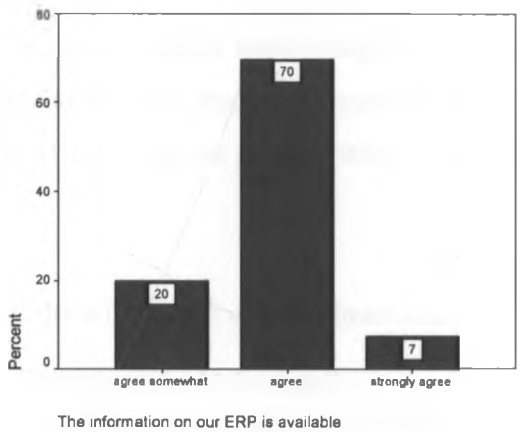


Figure 27: ERP information availability

4.2.3 Work reorganization dimension

ERP resulted to a significant 'power' or control shift leading to more than 70% of the respondents feeling loss of control of their previous way of doing things because the processes were standardized and information centralized. Also as aforementioned where the system could not be customized fully to suit the previous organizational processes, the organization had to adopt the ERP processes. Most of these respondents highlight that in the case of system breakdown maintenance or someone failing to do their bit of work, one can't work. Also if errors are made during the data posting without proper access rights one can't correct this. For others, they feel they have acquired more control of their work because of ease of access and manipulation of information crucial to their work, which before they had to 'haggle' various people to get.

According to more than 60% of the respondents ERP also significantly reduces the frequency of physical interaction between staff because information is centralized and easily accessible. This also shows that, ERP also somewhat introduces a certain 'dehumanizing element' just as Carton et al.

(2003) argued. One respondent actually put it as follows; *"you don't need me you need certain aspects of my work data, which you easily access from the system".*

ERP implementation also resulted in significant change in job organization and structuring aspects like job description, lines of reporting and job positions with more than 30% of the respondents attesting to this. Some roles were combined and others created. For example, in one case company a materials supervisor was now responsible for the receiving, recording and issuing of stocks whereas previously, there were three different individuals for each of the roles who were reporting to a stores supervisor. ERPs integrates most of the core organizational process and avails a centralized data source thus enabling collaboration and ease of work resulting to change in staff roles.

Interviews from the senior management also highlighted that indeed work reorganization occurred and continue to occur as a result of ERP adoption and that the process parameters for changing aspects like job positions, job descriptions and lines of reporting are greatly being centered on the ERP system processes.

Table 8 and figures 27-31 show the descriptive data of the information quality dimension.

Table 9: Descriptive Statistics for work reorganization dimension (spss 11.5 extract)

	N	Minimum	Maximum	Mean
ERP implementation resulted in loss of control of day to day aspects of my work	93	3.00	7.00	5.3118
ERP implementation reduced frequency of interaction with my colleagues	93	2.00	6.00	4.5699
ERP implementation led to change of my job description	93	2.00	6.00	3.7419
ERP implementation led to change of my position in the organization structure	93	2.00	6.00	3.4624
ERP implementation led to change to my lines of reporting	93	2.00	6.00	3.5699
Valid N (listwise)	93			

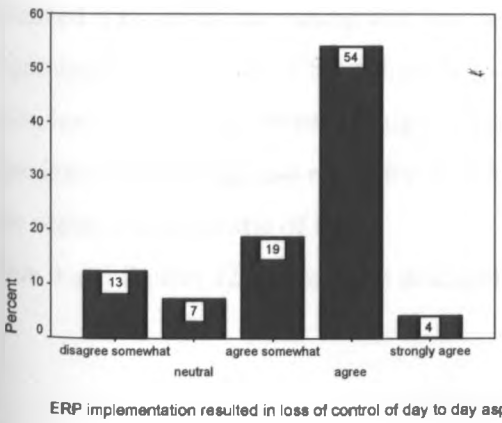


Figure 28: ERP and loss of work control

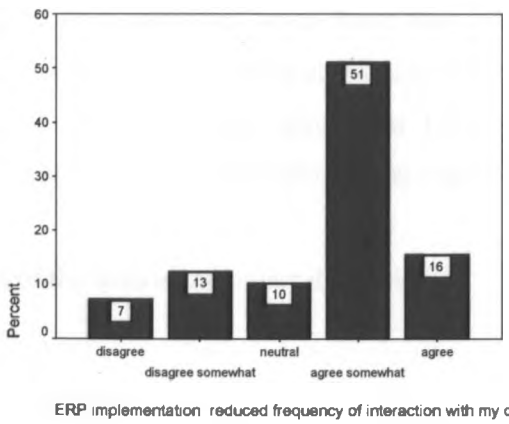


Figure 29: ERP and frequency of interaction

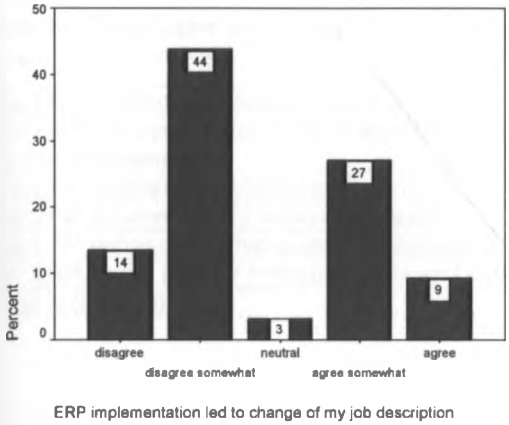


Figure 30: ERP and change of job description

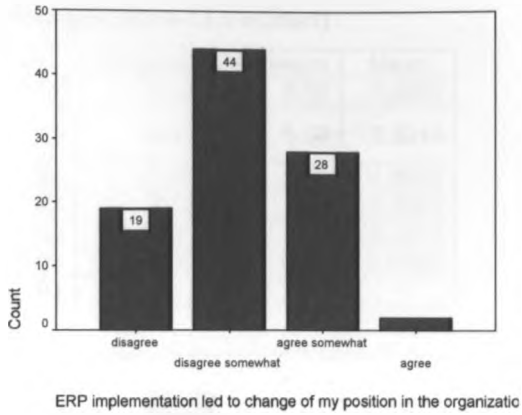


Figure 31: ERP and change of job position

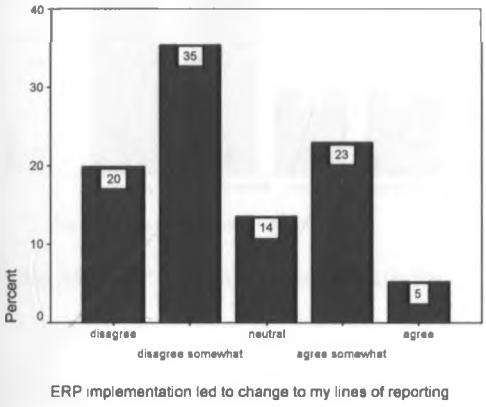


Figure 32: ERP and change of lines of reporting

4.2.4 Individual impact dimension

Through easy access to information, less paper work, less bureaucracy, easy tracking and improved approval process with faster decision turn around, more than 60% felt ERP made working better and even increased their individual performance. More than 50% of the respondents affirm that ERP enhanced their decision making and was beneficial to their individual tasks. More than 50% of the respondents disagree that ERP enhances individual creativity, organizational learning and recall for individual worker. However a significant 30% of the respondents agree that ERP enhances organizational learning and recall for individual worker with most citing information availability and ease access characteristic of ERPs.

Table 9 and figures 32-37 show the descriptive data of the individual impact dimension.

Table 10: Descriptive Statistics for individual impact dimension (spss 11.5 extract)

	N	Minimum	Maximum	Mean
Our ERP enhances individual creativity	93	2.00	5.00	3.2581
Our ERP enhances organizational learning and recall for individual worker	93	2.00	6.00	3.5914
Our ERP improves individual productivity	93	2.00	6.00	4.6882
Our ERP is beneficial for individual's tasks	93	2.00	7.00	5.2688
Our ERP enhances higher-quality of decision making	93	2.00	7.00	5.2903
Our ERP saves time for individual tasks and duties	93	2.00	6.00	4.8495
Valid N (listwise)	93			

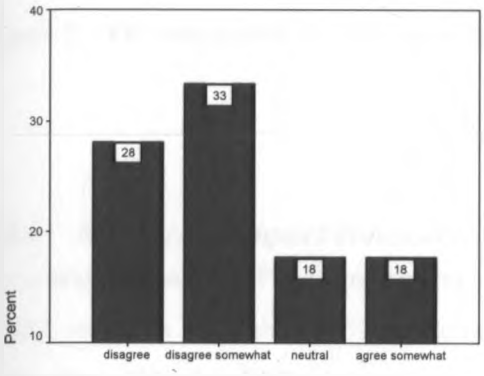


Figure 33: ERP and individual creativity

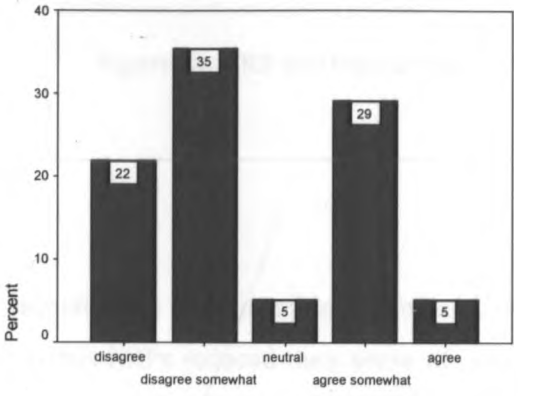


Figure 34: ERP and organizational learning

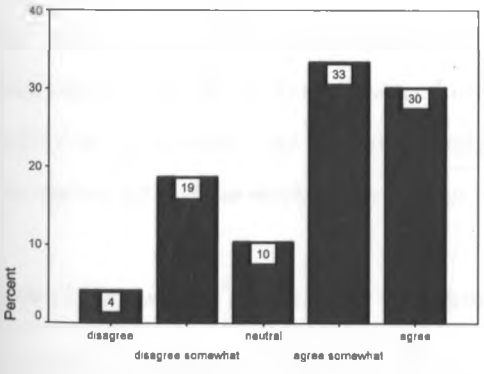


Figure 35: ERP and individual productivity

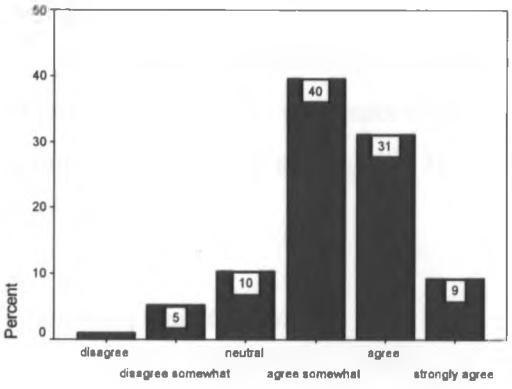


Figure 36: ERP and individual tasks

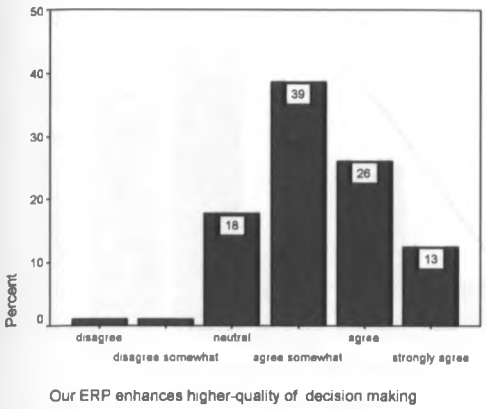


Figure 37: ERP and individual decision making

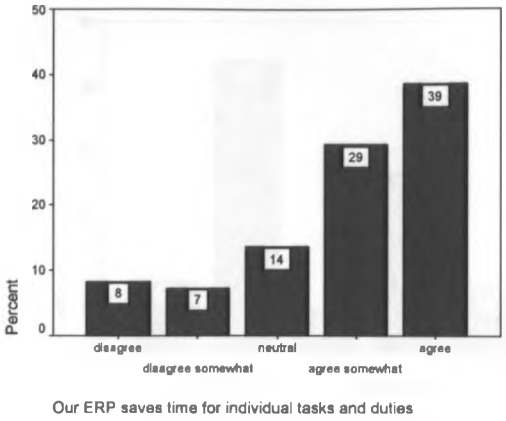


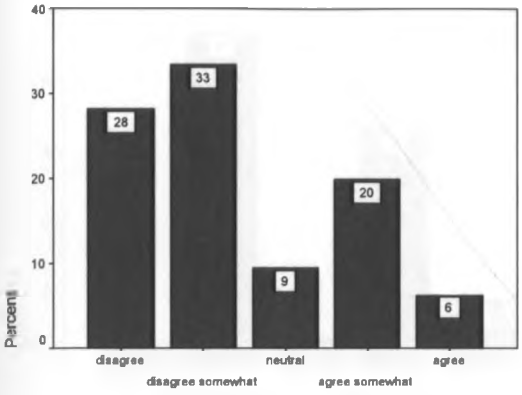
Figure 38: ERP and time saving

4.2.5 Workgroup impact dimension

As aforementioned ERP system implementation introduced a 'dehumanizing element' Carton et al., (2003) and thus more than 50% of the respondents felt ERPs reduced their sense of responsibility. More than 50% felt ERPs don't improve organizational-wide communication because of reduced physical interaction between staff in the organization. However more than 30% felt ERPs improved organizational wide communication citing the enhanced way of sharing of work information, better collaboration and streamlined processes through the ERPs. More than 70% of the respondents felt that ERPs improved inter-departmental coordination, sub-units efficiency and work-groups productivity with most citing enhanced information sharing. According to the respondents this greatly facilitated group tasks like planning, budgeting and reporting. Table 10 and figures 38-44 show the descriptive data of the workgroup impact dimension.

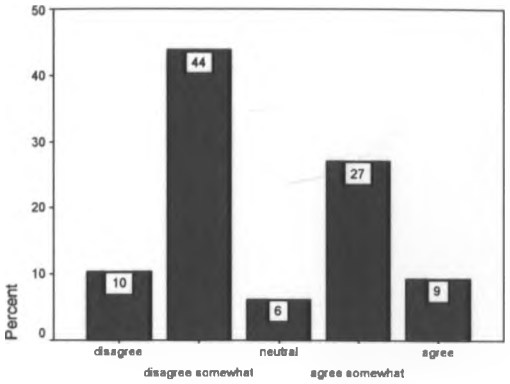
Table 11: Descriptive Statistics for workgroup impact dimension (spss 11.5 extract)

	N	Minimum	Maximum	Mean
Our ERP helps to improve workers' participation in the organization	93	2.00	6.00	3.4086
Our ERP improves organizational-wide communication	93	2.00	6.00	3.8065
Our ERP improves inter-departmental coordination	93	2.00	7.00	5.1613
Our ERP creates a sense of responsibility	93	2.00	6.00	3.4731
Our ERP improves the efficiency of sub-units in the organization	93	2.00	7.00	5.1720
Our ERP improves work-groups productivity	93	2.00	7.00	5.0108
Our ERP enhances solution effectiveness	93	2.00	6.00	3.9892
Valid N (listwise)	93			



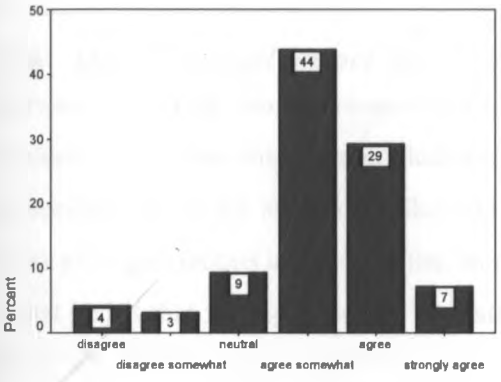
Our ERP helps to improve workers' participation in the organization

Figure 39: ERP and workers participation



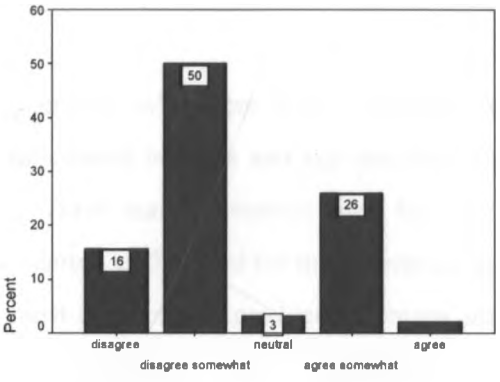
Our ERP improves organizational-wide communication

Figure 40: ERP and organizational-wide communication



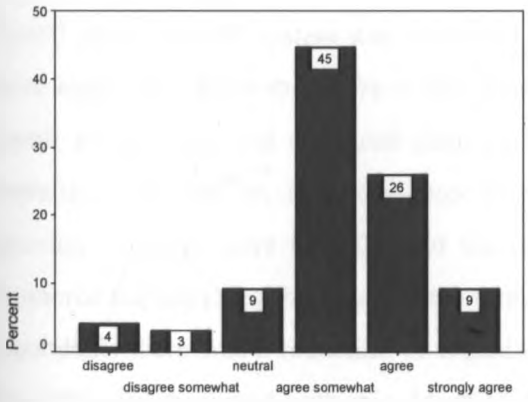
Our ERP improves inter-departmental coordination

Figure 41: ERP and inter-departmental coordination



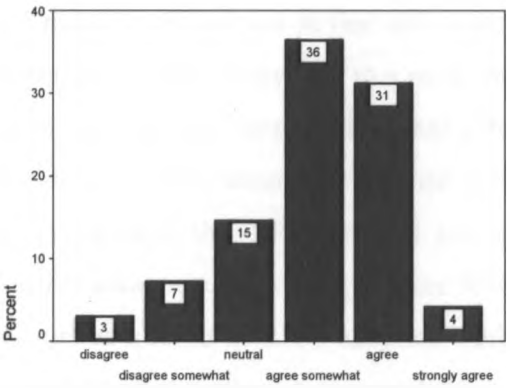
Our ERP creates a sense of responsibility

Figure 42: ERP and responsibility



Our ERP improves the efficiency of sub-units in the organization

Figure 43: ERP and sub-units efficiency



Our ERP improves work-groups productivity

Figure 44: ERP and work-groups productivity

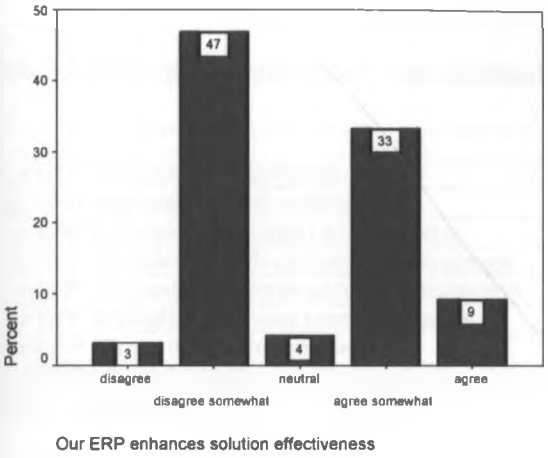


Figure 45: ERP and solution effectiveness

4.2.6 Organizational impact dimension

Interviews from the senior management and key members who were in the implementation team provided insight into the technological artifact – anticipated benefits and key decisions that guided the configuring of the system (Orlikowski, 2000). Three main objectives cited for ERP adoption across all organizations included in this study. First there was the need for more accurate information – most had it that a simple request for data from most departments produced so many inaccuracies and variances. The other objective was that the organizations were a standardized information technology platform for their business. Third top management wanted to use ERP to improve organizational efficiency and transform a number of business processes.

Overall effect of ERP system was perceived by most to be beneficial and in line with meeting the above objectives. More than 60% of the respondents perceived ERP to have led to a more improved overall productivity and enhanced decision making process through improved worker efficiency, centralized information, optimized processes, faster decision turn around and easier and faster reporting. Notably more than 60% of the respondents indicated that ERPs enabled e-business/e-commerce and provided the organization with competitive advantage. According to more 30% of the respondents there was a reduction in organizational costs as a result of ERPs adoption while more than 30% also disagreed with this. Most of the ones arguing a reduction of organization cost cited improved efficiency and while those arguing that there was an increase in cost cited that the initial cost of the system, implementation and the subsequent training was very high compared to other information system solutions implemented before. Table 11 and figures 45-52 show the descriptive data of the workgroup impact dimension.

Table 12: Descriptive Statistics for organizational impact dimension (spss 11.5 extract)

	N	Minimum	Maximum	Mean
Our ERP reduces organizational costs	93	2.00	6.00	3.9355
Our ERP improves overall productivity	93	2.00	6.00	4.8710
Our ERP enables e-business / e-commerce	93	2.00	6.00	5.0323
Our ERP provides us with competitive advantage	93	2.00	6.00	5.0000
Our ERP increases customer service/ satisfaction	93	2.00	6.00	4.8710
Our ERP facilitates business process change	93	2.00	6.00	4.8710
Our ERP supports decision making	93	2.00	7.00	5.3333
Our ERP allows for better use of organizational data resource	93	2.00	6.00	4.9892
Valid N (listwise)	93			

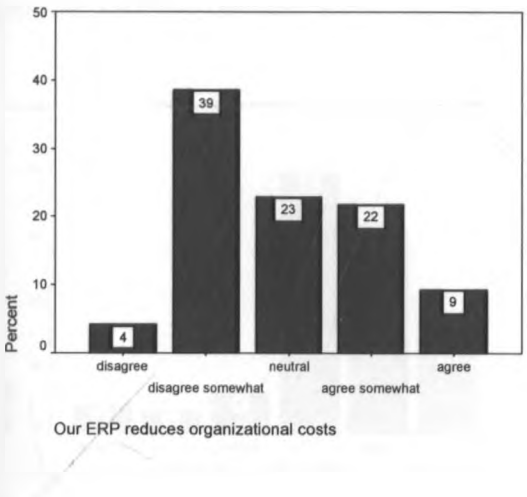


Figure 46: ERP and organizational costs

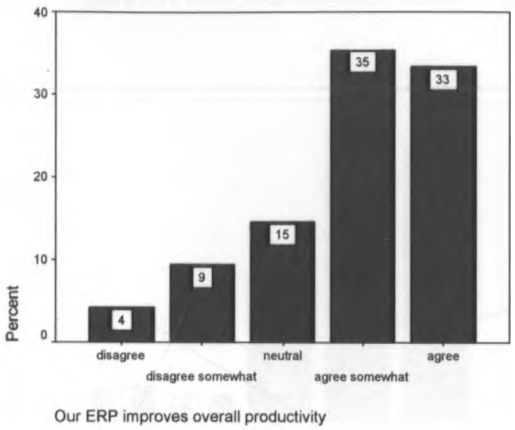


Figure 47: ERP and overall productivity

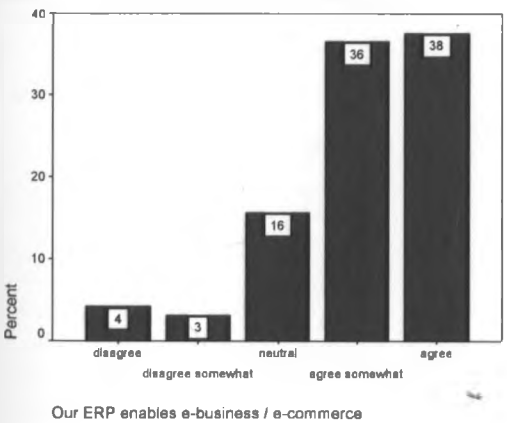


Figure 48: ERP and e-business

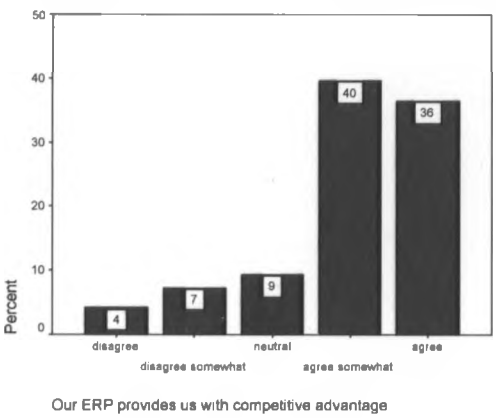


Figure 49: ERP and competitive advantage

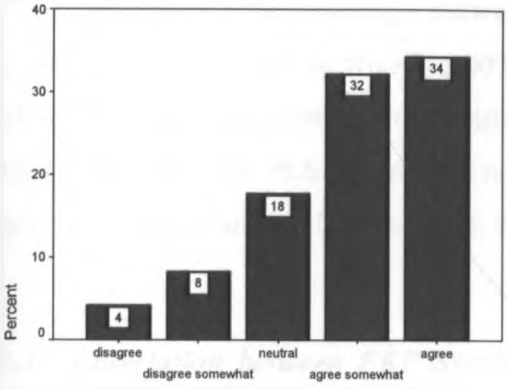


Figure 50: ERP and customer service satisfaction

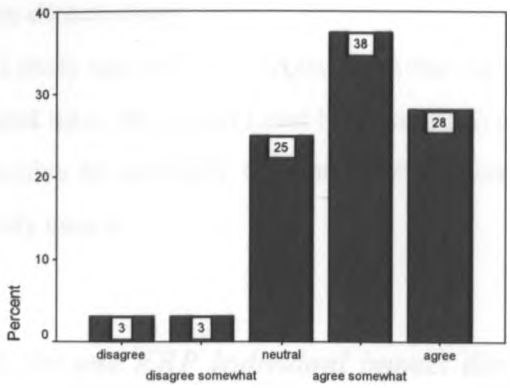


Figure 51: ERP and business process change

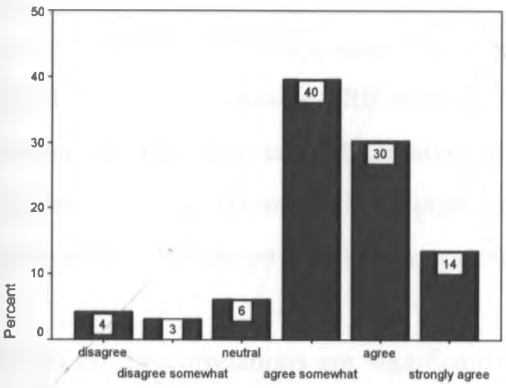


Figure 52: ERP and decision making

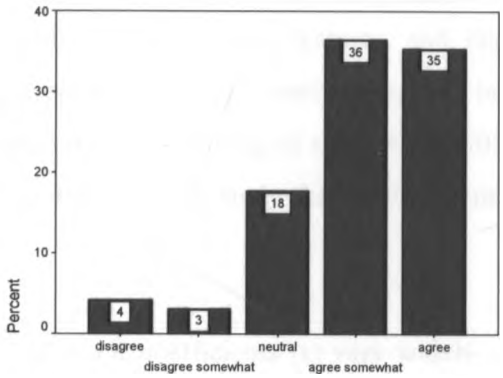


Figure 53: ERP and organizational data resource

4.3 Assessing the relationships between the dimensions

As aforementioned, guided by Ifinedo (2007), this study uses structural equation modeling (SEM) to examine the relationships between the constructs and takes the Partial Least Squares (PLS) approach. Chin (1998) notes that PLS approach is not sensitive to normality of data and can accommodate small-sized samples and it's for this reason this study uses it.

4.3.1 Correlation between ERP System quality and ERP Individual impact dimensions using Kendall's tau_b statistic.

Table 13 displays the correlation of the measures of system quality and Individual Impact dimensions. The measures of ERP system quality were systems data accuracy, flexibility, ease of use, ease of learning, reliability, data integration, customization, efficiency, features, and integration capability. The measures of ERP individual impact were productivity, creativity, system benefit to carrying out individual tasks, facilitation of decision making and saving of time. At p=0.05 all the correlations are significant. This supports the first hypothesis of this study that ERP System Quality significantly affects impact ERPs have on individual

Though all the correlations are significant the Kendall tau c coefficients (τ) vary widely and they range from 0.81 (the strongest) to 0.46 (the weakest) as displayed in figure 54. There is a strong positive relationship between ERPs systems data accuracy (τ = 0.548, p = 0.000) flexibility (τ = 0.629, p = 0.000), ease of use ((τ = 0.765, p = 0.000), ease of learning ((τ = 0.708, p = 0.000), reliability (τ = 0.731, p = 0.000), data integration (τ = 0.673, p = 0.000), customization (τ = 0.676, p = 0.000), efficiency (τ = 0.540, p = 0.000), features (τ = 0.683, p = 0.000), integration with other systems capability (τ = 0.782, p=0.000), meeting of user requirements (τ = 0.742, p = 0.000) and ERPs impact on individual productivity. The systems ease of use, ease of learning, reliability integration with other systems capability and meeting of user requirements seems to have significantly stronger relationship with the impact ERP has on individual productivity than the other measures of ERP system quality.

There is a strong positive relationship between ERPs systems data accuracy (τ = 0.510, p = 0.000) flexibility (τ = 0.672, p = 0.000), ease of use ((τ = 0.715, p = 0.000), ease of learning ((τ = 0.697, p = 0.000), reliability (τ = 0.619, p = 0.000), data integration capability (τ = 0.598, p = 0.000), customization (τ = 0.740, p = 0.000), efficiency (τ = 0.601, p = 0.000), features (τ = 0.640, p = 0.000), integration with other systems capability (τ = 0.746, p=0.000), meeting of user requirements (τ = 0.697, p = 0.000) and ERP impact on individual creativity. The systems ease of use, ease of learning and integration capability both data and with other systems seem to have significantly

stronger relationship with the impact ERP has individual creativeness than the other measures of ERP system quality.

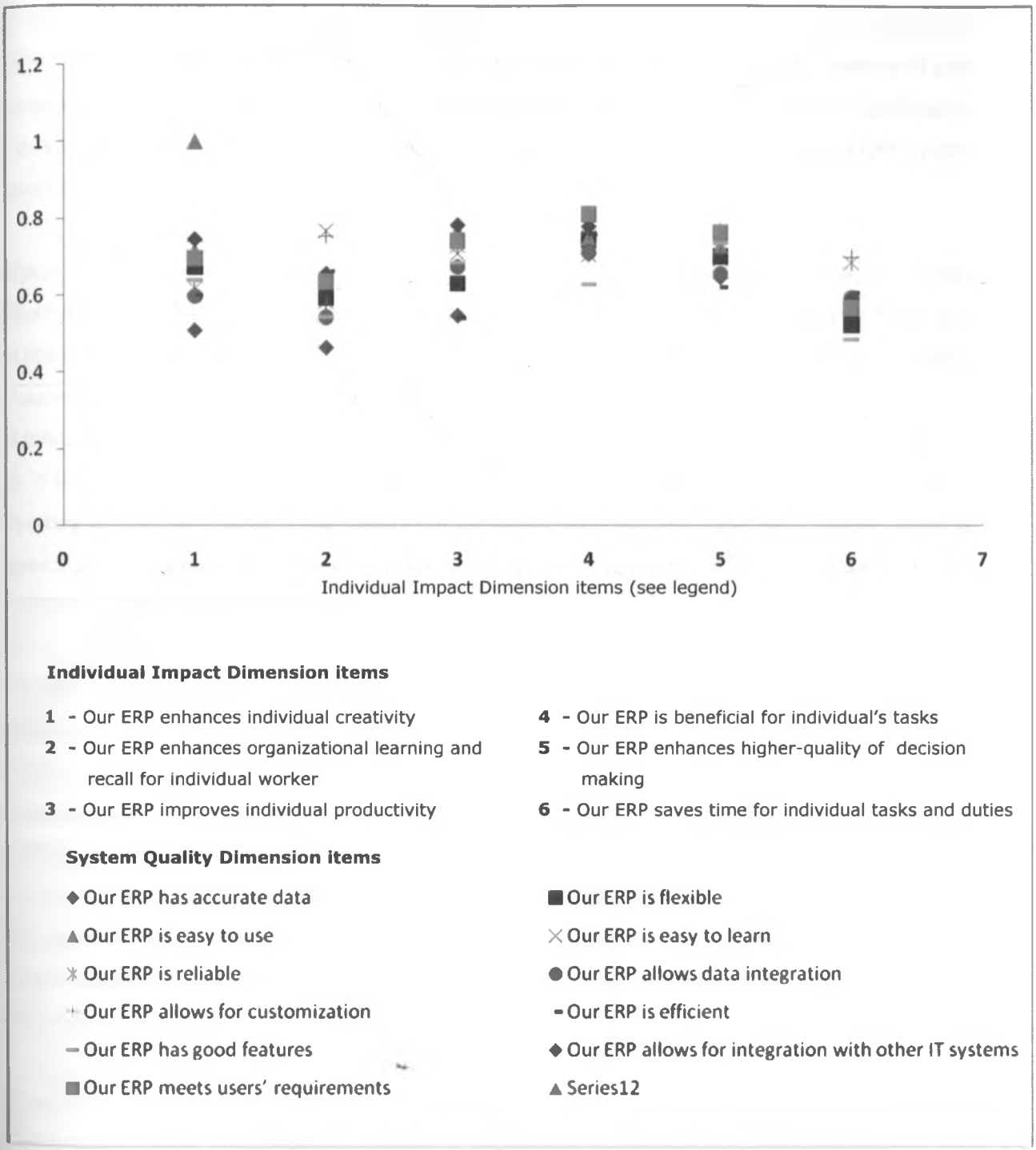


Figure 54: Correlation between ERP System quality and ERP Individual impact dimensions using Kendall's tau_b statistic

There is a strong positive relationship between ERPs systems data accuracy ($\tau = 0.708$, $p = 0.000$) flexibility ($\tau = 0.744$, $p = 0.000$), ease of use (($\tau = 0.748$, $p = 0.000$), ease of learning (($\tau = 0.705$, $p =$

0.000), reliability (τ = 0.788, p = 0.000), data integration capability (τ = 0.712, p = 0.000), customization (τ = 0.762, p = 0.000), efficiency (τ = 0.759, p = 0.000), features (τ = 0.629, p = 0.000), integration with other systems capability (τ = 0.779, p=0.000), meeting of user requirements (τ = 0.812, p = 0.000) and ERPs benefit to individual tasks. The systems reliability, meeting of user requirements and integration capability both data and with other systems seem to have significantly stronger relationship with the ERPs benefit to individual tasks than the other measures of ERP system quality.

There is a strong positive relationship between ERPs systems data accuracy (τ = 0.648, p = 0.000) flexibility (τ = 0.700, p = 0.000), ease of use ((τ = 0.728, p = 0.000), ease of learning ((τ = 0.695, p = 0.000), reliability (τ = 0.756, p = 0.000), data integration capability (τ = 0.657, p = 0.000), customization (τ = 0.716, p = 0.000), efficiency (τ = 0.621, p = 0.000), features (τ = 0.735, p = 0.000), integration with other systems capability (τ = 0.767, p=0.000), meeting of user requirements (τ = 0.764, p = 0.000) and ERPs impact on quality of decision making. The systems reliability, meeting of user requirements and integration capability both data and with other systems seem to have significantly stronger relationship with the ERPs impact on quality of decision making than the other measures of ERP system quality.

There is a strong positive relationship between ERPs systems data accuracy (τ = 0.465, p = 0.000) flexibility (τ = 0.591, p = 0.000), ease of use ((τ = 0.655, p = 0.000), ease of learning ((τ = 0.767, p = 0.000), reliability (τ = 0.585, p = 0.000), data integration capability (τ = 0.543, p = 0.000), customization (τ = 0.755, p = 0.000), efficiency (τ = 0.663, p = 0.000), features (τ = 0.543, p = 0.000), integration with other systems capability (τ = 0.656, p=0.000), meeting of user requirements (τ = 0.634, p = 0.000) and ERPs impact on organization learning and recall for individual worker. The systems ease to learn and customization seem to have significantly stronger relationship with the ERPs impact on organization learning and recall for individual worker than the other measures of ERP system quality.

There is a strong positive relationship between ERPs systems data accuracy (τ = 0.533, p = 0.000) flexibility (τ = 0.522, p = 0.000), ease of use ((τ = 0.575, p = 0.000), ease of learning ((τ = 0.573, p = 0.000), reliability (τ = 0.687, p = 0.000), data integration capability (τ = 0.595, p = 0.000), customization (τ = 0.701, p = 0.000), efficiency (τ = 0.608, p = 0.000), features (τ = 0.487, p = 0.000), integration with other systems capability (τ = 0.591, p=0.000), meeting of user requirements (τ = 0.567, p = 0.000) and ERPs impact on time taken to carry out individual tasks. The systems reliability, meeting of user requirements and integration capability both data and with other systems

seem to have significantly stronger relationship with the ERPs impact on time taken to carry out individual tasks than the other measures of ERP system quality.

4.3.2 Correlation between ERP Information quality and ERP Individual impact dimensions using Kendall's tau_b statistic.

Table 14 displays the correlation of the measures of ERPs information quality and ERPs Individual Impact dimensions. The measures of ERP information quality were information timeliness, understandability, importance, briefness, relevance, usability, availability and whether ERP database contents are up-to-date. The measures of ERP individual impact were productivity, creativity, system benefit to carrying out individual tasks, facilitation of decision making and saving of time. At p=0.05 all the correlations are significant. This supports the second hypothesis of this study that Quality of Information resulting from ERP systems will significantly affect the impact ERPs have on Individual. Though all the correlations are significant the Kendall tau c coefficients (τ) vary widely and they range from 0.84 (the strongest) to 0.39 (the weakest) as shown in figure 55.

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.613$, $p = 0.000$), understandability ($\tau = 0.754$, $p = 0.000$), importance ($\tau = 0.730$, $p = 0.000$), briefness ($\tau = 0.742$, $p = 0.000$), relevance ($\tau = 0.679$, $p = 0.000$), usability ($\tau = 0.673$, $p = 0.000$), availability ($\tau = 0.503$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.765$, $p = 0.000$) and ERPs impact on individual productivity. The ERPs information understandability, importance and database contents being up-to-date have significantly stronger relationship with the ERPs impact on individual productivity than the other measures of ERPs information quality.

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.509$, $p = 0.000$), understandability ($\tau = 0.703$, $p = 0.000$), importance ($\tau = 0.721$, $p = 0.000$), briefness ($\tau = 0.697$, $p = 0.000$), relevance ($\tau = 0.534$, $p = 0.000$), usability ($\tau = 0.526$, $p = 0.000$), availability ($\tau = 0.486$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.648$, $p = 0.000$) and ERPs impact on individual creativity. The ERPs information understandability and importance have significantly stronger relationship with the ERPs impact on individual creativity than the other measures of ERPs information quality.

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.771$, $p = 0.000$), understandability ($\tau = 0.741$, $p = 0.000$), importance ($\tau = 0.731$, $p = 0.000$), briefness ($\tau = 0.812$, $p = 0.000$), relevance ($\tau = 0.621$, $p = 0.000$), usability ($\tau = 0.526$, $p = 0.000$), availability ($\tau = 0.486$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.694$, $p = 0.000$) and ERPs benefit to individual tasks. The ERPs information timeliness and briefness have significantly stronger

relationship with the ERPs benefit to individual tasks than the other measures of ERPs information quality.

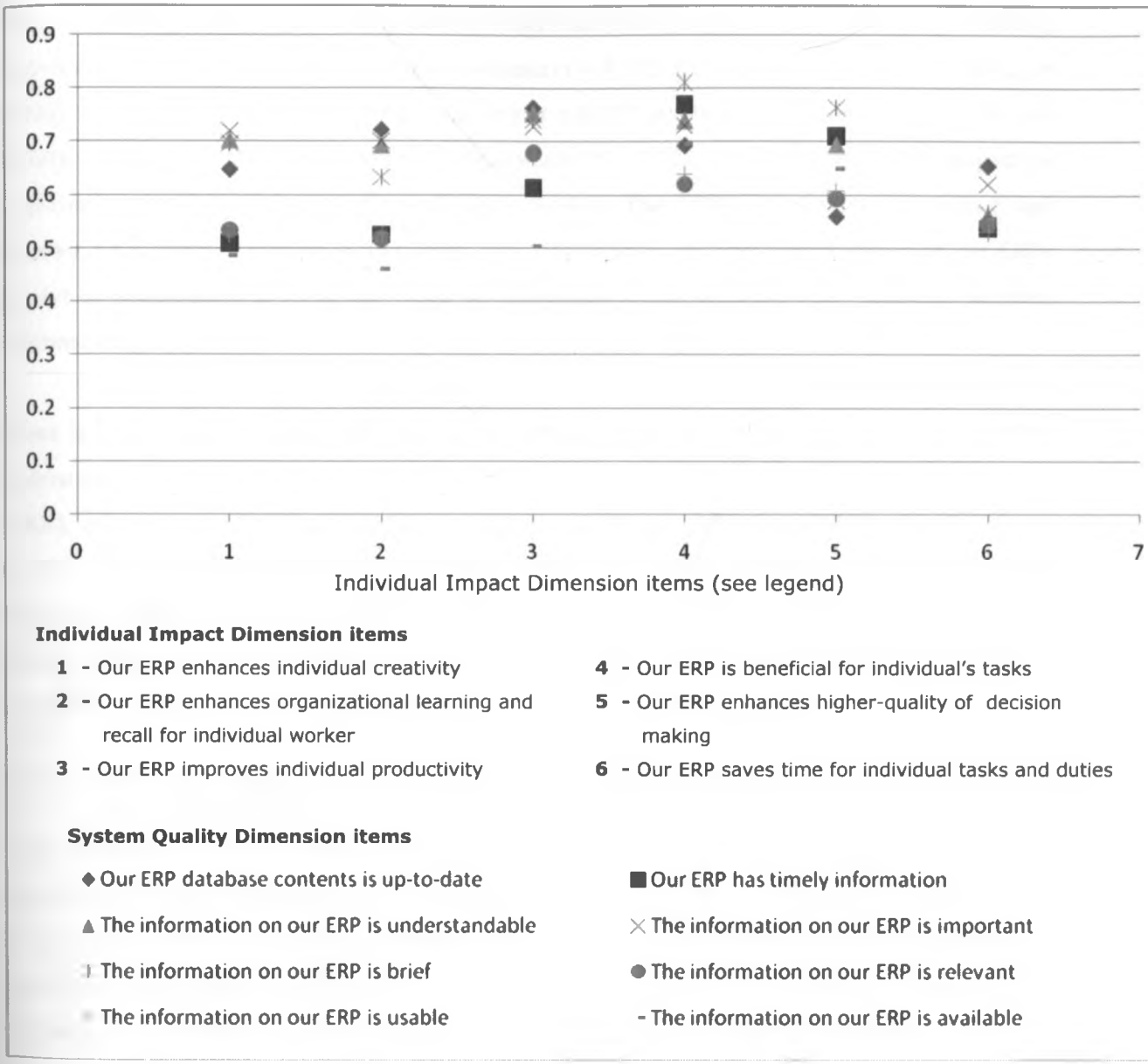


Figure 55: Correlation between ERP Information quality and ERP Individual impact dimensions using Kendall's tau_b statistic

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.711$, $p = 0.000$), understandability ($\tau = 0.695$, $p = 0.000$), importance ($\tau = 0.589$, $p = 0.000$), briefness ($\tau = 0.764$, $p = 0.000$), relevance ($\tau = 0.593$, $p = 0.000$), usability ($\tau = 0.607$, $p = 0.000$), availability ($\tau = 0.649$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.559$, $p = 0.000$) and ERPs impact on quality of decision making. The ERPs information timeliness and briefness have significantly

stronger relationship with the ERPs impact on quality of decision making than the other measures of ERPs information quality.

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.525$, $p = 0.000$), understandability ($\tau = 0.694$, $p = 0.000$), importance ($\tau = 0.702$, $p = 0.000$), briefness ($\tau = 0.634$, $p = 0.000$), relevance ($\tau = 0.518$, $p = 0.000$), usability ($\tau = 0.527$, $p = 0.000$), availability ($\tau = 0.391$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.723$, $p = 0.000$) and ERPs impact on organization learning and recall for individual worker. The ERPs information importance and whether ERP database content is up-to-date have significantly stronger relationship with the ERPs impact on organization learning and recall for individual worker than the other measures of ERPs information quality.

There is a strong positive relationship between ERPs information timeliness ($\tau = 0.538$, $p = 0.000$), understandability ($\tau = 0.561$, $p = 0.000$), importance ($\tau = 0.620$, $p = 0.000$), briefness ($\tau = 0.567$, $p = 0.000$), relevance ($\tau = 0.547$, $p = 0.000$), usability ($\tau = 0.531$, $p = 0.000$), availability ($\tau = 0.556$, $p = 0.000$), whether ERP database contents are up-to-date ($\tau = 0.655$, $p = 0.000$) and ERPs impact on time taken to carry out individual tasks. The ERPs information importance and whether ERP database content is up-to-date have significantly stronger relationship with the ERPs impact on time taken to carry out individual tasks than the other measures of ERPs information quality.

4.3.3 Correlation between work reorganization and ERPs Individual impact dimensions using Kendall's tau_b statistic.

Table 15 displays the correlation of the measures of work reorganization brought about by ERPs adoption and ERPs Individual Impact dimensions. The measures of work reorganization were change in job control, change in interaction with colleagues, change in job descriptions, change in job positions and change in lines of reporting. The measures of ERP individual impact were productivity, creativity, system benefit to carrying out individual tasks, facilitation of decision making and saving of time. At p=0.05 all the correlations are significant. This supports the third hypothesis of this study that Work reorganization resulting from ERP systems significantly affects impact ERPs have on Individual. Though all the correlations are significant the Kendall tau c coefficients (τ) vary widely and they range from 0.83 (the strongest) to 0.6 (the weakest) as shown in figure 56.

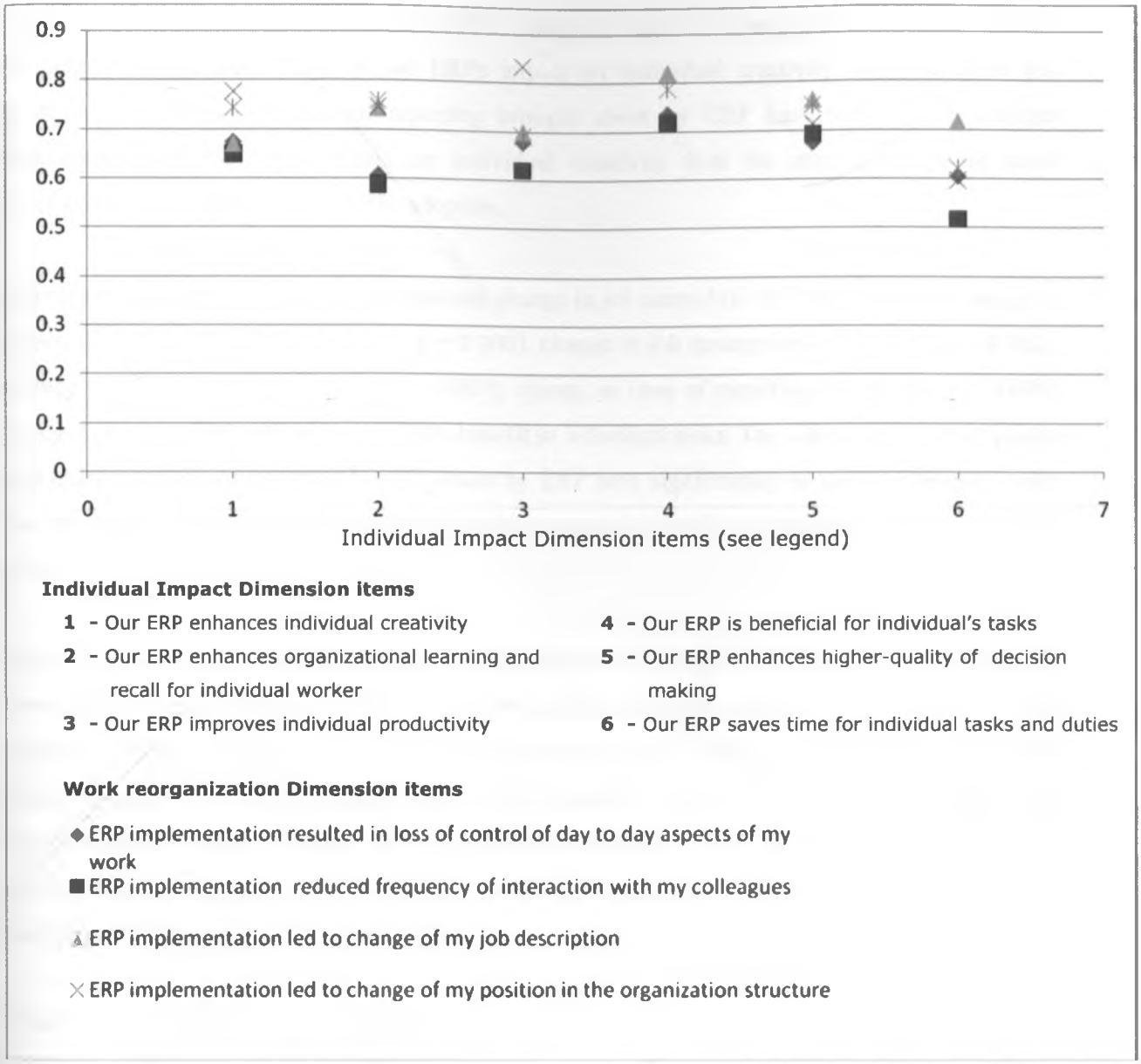


Figure 56: Correlation between ERP work reorganization and ERP Individual impact dimensions using Kendall's tau_b statistic

There is a strong positive relationship between change in job control ($\tau = 0.678$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.620$, $p = 0.000$), change in job descriptions ($\tau = 0.698$, $p = 0.000$), change in job positions ($\tau = 0.833$, $p = 0.000$), change in lines of reporting ($\tau = 0.690$, $p = 0.000$) brought about by ERPs adoption and ERPs impact on individual productivity. The change in job positions and change in lines of reporting brought about by ERP have significantly stronger relationship with the ERPs impact on individual productivity than the other measures of work reorganization brought about by ERPs adoption.

There is a strong positive relationship between change in job control ($\tau = 0.673$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.649$, $p = 0.000$), change in job descriptions ($\tau = 0.668$, $p = 0.000$),

change in job positions ($\tau = 0.776$, $p = 0.000$), change in lines of reporting ($\tau = 0.743$, $p = 0.000$) brought about by ERPs adoption and ERPs impact on individual creativity. The change in job positions and change in lines of reporting brought about by ERP have significantly stronger relationship with the ERPs impact on individual creativity than the other measures of work reorganization brought about by ERPs adoption.

There is a strong positive relationship between change in job control ($\tau = 0.735$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.717$, $p = 0.000$), change in job descriptions ($\tau = 0.819$, $p = 0.000$), change in job positions ($\tau = 0.721$, $p = 0.000$), change in lines of reporting ($\tau = 0.787$, $p = 0.000$) brought about by ERPs adoption and ERPs benefit to individual tasks. The change in job descriptions and change in lines of reporting brought about by ERP have significantly stronger relationship with the ERPs benefit to individual tasks than the other measures of work reorganization brought about by ERPs adoption.

There is a strong positive relationship between change in job control ($\tau = 0.675$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.692$, $p = 0.000$), change in job descriptions ($\tau = 0.761$, $p = 0.000$), change in job positions ($\tau = 0.712$, $p = 0.000$), change in lines of reporting ($\tau = 0.751$, $p = 0.000$) brought about by ERPs adoption and ERPs impact on quality of decision making. The change in job descriptions and change in lines of reporting brought about by ERP have significantly stronger relationship with the ERPs impact on quality of decision making than the other measures of work reorganization brought about by ERPs adoption.

There is a strong positive relationship between change in job control ($\tau = 0.606$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.586$, $p = 0.000$), change in job descriptions ($\tau = 0.743$, $p = 0.000$), change in job positions ($\tau = 0.745$, $p = 0.000$), change in lines of reporting ($\tau = 0.758$, $p = 0.000$) brought about by ERPs adoption and ERPs impact on organization learning and recall for individual worker. The change in job descriptions and change in lines of reporting brought about by ERP have significantly stronger relationship with the ERPs impact on organization learning and recall for individual worker than the other measures of work reorganization brought about by ERPs adoption.

There is a strong positive relationship between change in job control ($\tau = 0.604$, $p = 0.000$), change in interaction with colleagues ($\tau = 0.516$, $p = 0.000$), change in job descriptions ($\tau = 0.714$, $p = 0.000$), change in job positions ($\tau = 0.596$, $p = 0.000$), change in lines of reporting ($\tau = 0.621$, $p = 0.000$) brought about by ERPs adoption and ERPs impact on time taken to carry out individual tasks. The change in job descriptions and change in lines of reporting brought about by ERP have significantly

stronger relationship with the ERPs impact on time taken to carry out individual tasks than the other measures of work reorganization brought about by ERPs adoption.

4.3.4 Correlation between ERPs Individual impact ERPs workgroup impact dimensions using Kendall's tau_b statistic.

Table 16 displays the correlation of the measures of ERPs individual impact and ERPs workgroup Impact dimensions. The measures of ERPs individual impact were productivity, creativity, system benefit to carrying out individual tasks, impact on organizational learning and recall for individual worker, facilitation of decision making and saving of time. The measures of ERPs workgroup impact were change in workers participation in the organization, organizational wide communication, interdepartmental coordination, sense of responsibility, efficiency of sub-units in the organization, workgroups productivity and solution effectiveness. At p=0.05 all the correlations are significant. This supports the fourth hypothesis of this study that Impact of ERPs on Individual significantly affects Impact ERPs have on the Workgroups. Though all the correlations are significant the Kendall tau c coefficients (τ) vary widely and they range from 0.97 (the strongest) to 0.55 (the weakest) as shown in figure 57.

There is a strong positive relationship between ERPs impact on individual creativity (τ = 0.965, p = 0.000), organizational learning and recall for individual worker (τ = 0.760, p = 0.000), individual productivity (τ = 0.762, p = 0.000), system benefit to carrying out individual tasks (τ = 0.654, p = 0.000), facilitation of decision making (τ = 0.650, p = 0.000), saving of time for individual tasks (τ = 0.553, p = 0.000) and ERPs impact on workers participation in the organization. The ERPs impact on individual productivity, creativity and organization learning and recall for individual worker have significantly stronger relationship with the ERPs impact on workers participation in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on individual creativity (τ = 0.753, p = 0.000), organizational learning and recall for individual worker (τ = 0.764, p = 0.000), individual productivity (τ = 0.789, p = 0.000), system benefit to carrying out individual tasks (τ = 0.716, p = 0.000), facilitation of decision making (τ = 0.722, p = 0.000), saving of time for individual tasks (τ = 0.601, p = 0.000) and ERPs impact on organizational-wide communication. The ERPs impact on individual productivity, creativity and organization learning and recall for individual worker have significantly stronger relationship with the ERPs impact on organizational-wide communication than the other measures of ERP workgroup impact dimension.

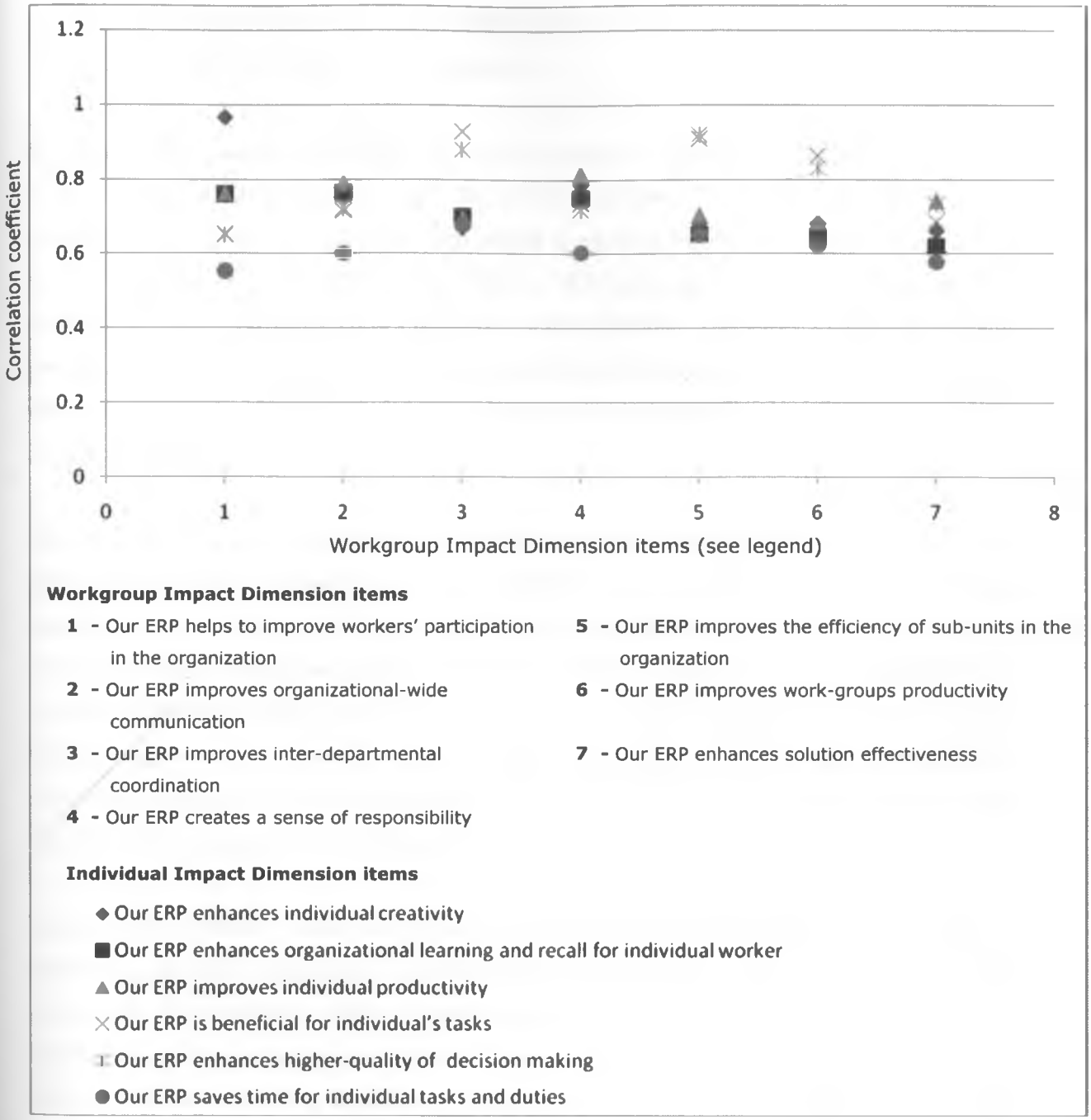


Figure 57: Correlation between ERP Individual impact and ERP workgroup impact dimensions using Kendall's tau_b statistic

There is a strong positive relationship between ERPs impact on individual creativity ($\tau = 0.753$, $p = 0.000$), organizational learning and recall for individual worker ($\tau = 0.764$, $p = 0.000$), individual productivity ($\tau = 0.789$, $p = 0.000$), system benefit to carrying out individual tasks ($\tau = 0.716$, $p = 0.000$), facilitation of decision making ($\tau = 0.722$, $p = 0.000$), saving of time for individual tasks ($\tau = 0.601$, $p = 0.000$) and ERPs impact on inter-departmental coordination. The ERPs impact on individual productivity, creativity and organization learning and recall for individual worker have

significantly stronger relationship with the ERPs impact on inter-departmental coordination than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on individual creativity ($\tau = 0.787$, $p = 0.000$), organizational learning and recall for individual worker ($\tau = 0.751$, $p = 0.000$), individual productivity ($\tau = 0.814$, $p = 0.000$), system benefit to carrying out individual tasks ($\tau = 0.736$, $p = 0.000$), facilitation of decision making ($\tau = 0.719$, $p = 0.000$), saving of time for individual tasks ($\tau = 0.604$, $p = 0.000$) and ERPs impact on sense of responsibility. The ERPs impact on individual productivity, creativity and organization learning and recall for individual worker have significantly stronger relationship with the ERPs impact on sense of responsibility than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on individual creativity ($\tau = 0.683$, $p = 0.000$), organizational learning and recall for individual worker ($\tau = 0.652$, $p = 0.000$), individual productivity ($\tau = 0.704$, $p = 0.000$), system benefit to carrying out individual tasks ($\tau = 0.909$, $p = 0.000$), facilitation of decision making ($\tau = 0.920$, $p = 0.000$), saving of time for individual tasks ($\tau = 0.650$, $p = 0.000$) and ERPs impact on efficiency of sub-units in the organization. The ERPs impact on individual productivity, benefits to individual tasks and impact on quality of decision making have significantly stronger relationship with the ERPs impact on efficiency of sub-units in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on individual creativity ($\tau = 0.682$, $p = 0.000$), organizational learning and recall for individual worker ($\tau = 0.647$, $p = 0.000$), individual productivity ($\tau = 0.684$, $p = 0.000$), system benefit to carrying out individual tasks ($\tau = 0.864$, $p = 0.000$), facilitation of decision making ($\tau = 0.830$, $p = 0.000$), saving of time for individual tasks ($\tau = 0.624$, $p = 0.000$) and ERPs impact on workgroups productivity. The ERPs impact on individual productivity, benefits to individual tasks and impact on quality of decision making have significantly stronger relationship with the ERPs impact on workgroups productivity than the other measures of ERP workgroup impact dimension.

4.3.5 Correlation between ERPs workgroup impact ERPs organizational impact dimensions using Kendall's tau_b statistic.

Table 17 displays the correlation of the measures of ERPs individual impact and ERPs workgroup Impact dimensions. The measures of ERPs workgroup impact were change in workers participation in the organization, organizational wide communication, interdepartmental coordination, sense of responsibility, efficiency of sub-units in the organization, workgroups productivity and solution effectiveness. The measures of ERPs organizational impact were ERPs impact on cost, overall

productivity, e-business/ e-commerce, competitive advantage, customer service, business process change, decision making and use of organizational data resource. At p=0.05 all the correlations are significant. This supports the fourth hypothesis of this study that Impact of ERPs on workgroups significantly affects the overall Impact ERPs have on the organization. Though all the correlations are significant the Kendall tau c coefficients (τ) vary widely and they range from 0.82 (the strongest) to 0.42 (the weakest) as shown in figure 58.

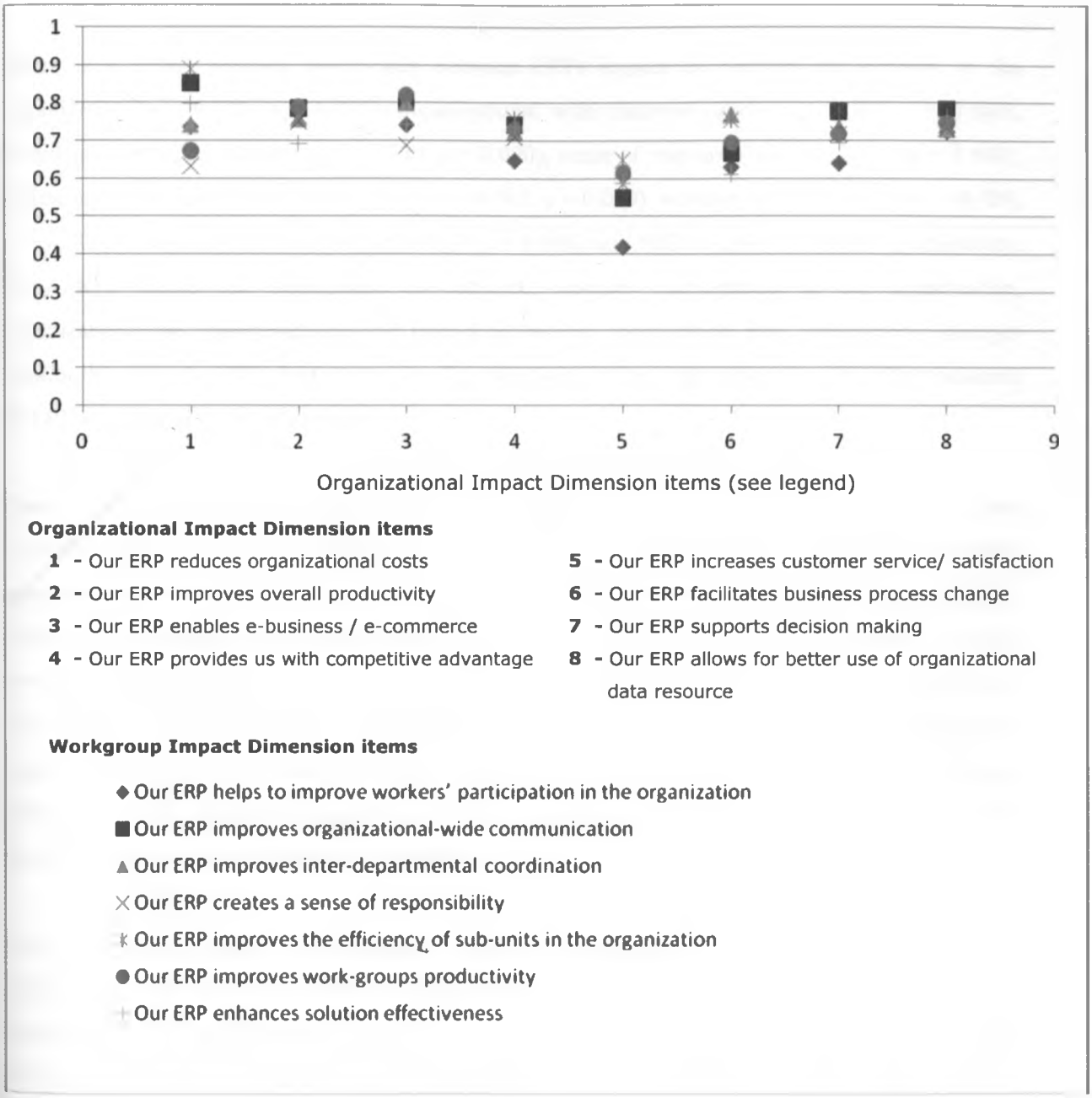


Figure 58: Correlation between ERP workgroup impact and ERP organizational impact dimensions using Kendall's tau_b statistic

There is a strong positive relationship between ERPs impact on workers participation in the organization ($\tau = 0.737$, $p = 0.000$), organizational wide communication ($\tau = 0.853$, $p = 0.000$),

interdepartmental coordination ($\tau = 0.744$, $p = 0.000$), sense of responsibility ($\tau = 0.634$, $p = 0.000$), efficiency of sub-units in the organization ($\tau = 0.890$, $p = 0.000$), workgroups productivity ($\tau = 0.674$, $p = 0.000$), solution effectiveness ($\tau = 0.798$, $p = 0.000$) and ERPs impact on organizational cost. The ERPs impact on efficiency of sub-units in the organization, organization-wide communication and solution effectiveness have significantly stronger relationship with the ERPs impact on organizational cost than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization ($\tau = 0.780$, $p = 0.000$), organizational wide communication ($\tau = 0.786$, $p = 0.000$), interdepartmental coordination ($\tau = 0.759$, $p = 0.000$), sense of responsibility ($\tau = 0.752$, $p = 0.000$), efficiency of sub-units in the organization ($\tau = 0.765$, $p = 0.000$), workgroups productivity ($\tau = 0.789$, $p = 0.000$), solution effectiveness ($\tau = 0.694$, $p = 0.000$) and ERPs impact on overall productivity. The ERPs impact on workgroups productivity, workers participation in the organization, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on overall productivity in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization ($\tau = 0.742$, $p = 0.000$), organizational wide communication ($\tau = 0.804$, $p = 0.000$), interdepartmental coordination ($\tau = 0.801$, $p = 0.000$), sense of responsibility ($\tau = 0.689$, $p = 0.000$), efficiency of sub-units in the organization ($\tau = 0.809$, $p = 0.000$), workgroups productivity ($\tau = 0.821$, $p = 0.000$), solution effectiveness ($\tau = 0.744$, $p = 0.000$) and ERPs impact on e-business/ e-commerce. The ERPs impact on workers participation in the organization, workgroups productivity, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on e-business/ e-commerce in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization ($\tau = 0.648$, $p = 0.000$), organizational wide communication ($\tau = 0.743$, $p = 0.000$), interdepartmental coordination ($\tau = 0.726$, $p = 0.000$), sense of responsibility ($\tau = 0.712$, $p = 0.000$), efficiency of sub-units in the organization ($\tau = 0.759$, $p = 0.000$), workgroups productivity ($\tau = 0.733$, $p = 0.000$), solution effectiveness ($\tau = 0.739$, $p = 0.000$) and ERPs impact on competitive advantage. ERPs impact on workgroups productivity, efficiency of sub-units in the organization, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on competitive advantage in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization (τ = 0.420, p = 0.000), organizational wide communication (τ = 0.549, p = 0.000), interdepartmental coordination (τ = 0.622, p = 0.000), sense of responsibility (τ = 0.587, p = 0.000), efficiency of sub-units in the organization (τ = 0.651, p = 0.000), workgroups productivity (τ = 0.616, p = 0.000), solution effectiveness (τ = 0.591, p = 0.000) and ERPs impact on customer service. ERPs impact on workgroups productivity, efficiency of sub-units in the organization, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on customer service in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization (τ = 0.631, p = 0.000), organizational wide communication (τ = 0.668, p = 0.000), interdepartmental coordination (τ = 0.770, p = 0.000), sense of responsibility (τ = 0.587, p = 0.000), efficiency of sub-units in the organization (τ = 0.651, p = 0.000), workgroups productivity (τ = 0.616, p = 0.000), solution effectiveness (τ = 0.591, p = 0.000) and ERPs impact on business process change. ERPs impact on workgroups productivity, efficiency of sub-units in the organization, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on business process change in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization (τ = 0.641, p = 0.000), organizational wide communication (τ = 0.778, p = 0.000), interdepartmental coordination (τ = 0.737, p = 0.000), sense of responsibility (τ = 0.718, p = 0.000), efficiency of sub-units in the organization (τ = 0.780, p = 0.000), workgroups productivity (τ = 0.719, p = 0.000), solution effectiveness (τ = 0.697, p = 0.000) and ERPs impact on decision making. ERPs impact on efficiency of sub-units in the organization, organization-wide communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on decision making in the organization than the other measures of ERP workgroup impact dimension.

There is a strong positive relationship between ERPs impact on workers participation in the organization (τ = 0.725, p = 0.000), organizational wide communication (τ = 0.785, p = 0.000), interdepartmental coordination (τ = 0.733, p = 0.000), sense of responsibility (τ = 0.734, p = 0.000), efficiency of sub-units in the organization (τ = 0.743, p = 0.000), workgroups productivity (τ = 0.747, p = 0.000), solution effectiveness (τ = 0.764, p = 0.000) and ERPs impact on the use of organizational data resource. ERPs impact on efficiency of sub-units in the organization, organization-wide

communication and inter-departmental coordination have significantly stronger relationship with the ERPs impact on ERPs impact on the use of organizational data resource than the other measures of ERP workgroup impact dimension.

Table 13: Correlation between ERP System quality and ERP Individual impact dimensions using Kendall's tau_b statistic.

		Our ERP enhances individual creativity	Our ERP enhances organizational learning and recall for individual worker	Our ERP improves individual productivity	Our ERP is beneficial for individual's tasks	Our ERP enhances higher-quality of decision making	Our ERP saves time for individual tasks and duties
Our ERP has accurate data	Correlation Coefficient	.510(**)	.465(**)	.548(**)	.708(**)	.648(**)	.533(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP is flexible	Correlation Coefficient	.672(**)	.591(**)	.629(**)	.744(**)	.700(**)	.522(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP is easy to use	Correlation Coefficient	.715(**)	.655(**)	.765(**)	.748(**)	.728(**)	.575(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP is easy to learn	Correlation Coefficient	.697(**)	.767(**)	.708(**)	.705(**)	.695(**)	.573(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP is reliable	Correlation Coefficient	.619(**)	.585(**)	.731(**)	.788(**)	.756(**)	.687(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP allows data integration	Correlation Coefficient	.598(**)	.543(**)	.673(**)	.712(**)	.657(**)	.595(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93

Our ERP allows for customization	Correlation Coefficient	.740(**)	.755(**)	.676(**)	.762(**)	.716(**)	.701(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP is efficient	Correlation Coefficient	.601(**)	.663(**)	.540(**)	.759(**)	.621(**)	.608(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP has good features	Correlation Coefficient	.640(**)	.543(**)	.683(**)	.629(**)	.735(**)	.487(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP allows for integration with other IT systems	Correlation Coefficient	.746(**)	.656(**)	.782(**)	.779(**)	.767(**)	.591(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP meets users' requirements	Correlation Coefficient	.697(**)	.634(**)	.742(**)	.812(**)	.764(**)	.567(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93

** Correlation is significant at the 0.01 level (2-tailed).

Table 14: Correlation between ERP Information quality and ERP Individual impact dimensions using Kendall's tau_b statistic.

		Our ERP enhances individual creativity	Our ERP enhances organizational learning and recall for individual worker	Our ERP improves individual productivity	Our ERP is beneficial for individual's tasks	Our ERP enhances higher-quality of decision making	Our ERP saves time for individual tasks and duties
Our ERP database contents is up-to-date	Correlation Coefficient	.648(**)	.723(**)	.765(**)	.694(**)	.559(**)	.655(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
Our ERP has timely information	Correlation Coefficient	.509(**)	.525(**)	.613(**)	.771(**)	.711(**)	.538(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
The information on our ERP is understandable	Correlation Coefficient	.703(**)	.694(**)	.754(**)	.741(**)	.695(**)	.561(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
The information on our ERP is important	Correlation Coefficient	.721(**)	.702(**)	.730(**)	.731(**)	.589(**)	.620(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
The information on our ERP is brief	Correlation Coefficient	.697(**)	.634(**)	.742(**)	.812(**)	.764(**)	.567(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
The information on our ERP is relevant	Correlation Coefficient	.534(**)	.518(**)	.679(**)	.621(**)	.593(**)	.547(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93

The information on our ERP is usable	Correlation Coefficient	.526(**)	.527(**)	.673(**)	.639(**)	.607(**)	.531(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
The information on our ERP is available	Correlation Coefficient	.486(**)	.461(**)	.503(**)	.698(**)	.649(**)	.556(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93

** Correlation is significant at the 0.01 level (2-tailed).

Table 15: Correlation between ERP Work reorganization and ERP Individual impact dimensions using Kendall's tau_b statistic.

		Our ERP enhances individual creativity	Our ERP enhances organizational learning and recall for individual worker	Our ERP improves individual productivity	Our ERP is beneficial for individual's tasks	Our ERP enhances higher-quality of decision making	Our ERP saves time for individual tasks and duties
ERP implementation resulted in loss of control of day to day aspects of my work	Correlation Coefficient	.673(**)	.606(**)	.678(**)	.735(**)	.675(**)	.604(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
ERP implementation reduced frequency of interaction with my colleagues	Correlation Coefficient	.649(**)	.586(**)	.620(**)	.717(**)	.692(**)	.516(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
ERP implementation led to change of my job description	Correlation Coefficient	.668(**)	.743(**)	.698(**)	.819(**)	.761(**)	.714(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
ERP implementation led to change of my position in the organization structure	Correlation Coefficient	.776(**)	.745(**)	.833(**)	.721(**)	.712(**)	.596(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93
ERP implementation led to change to my lines of reporting	Correlation Coefficient	.743(**)	.758(**)	.690(**)	.787(**)	.751(**)	.621(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93

** Correlation is significant at the 0.01 level (2-tailed).

Table 16: Correlation between ERP Individual Impact and ERP workgroup impact dimensions using Kendall's tau_b statistic.

		Our ERP helps to improve workers' participation in the organization	Our ERP improves organizational-wide communication	Our ERP improves inter-departmental coordination	Our ERP creates a sense of responsibility	Our ERP improves the efficiency of sub-units in the organization	Our ERP improves work-groups productivity	Our ERP enhances solution effectiveness
Our ERP enhances individual creativity	Correlation Coefficient	.965(**)	.753(**)	.670(**)	.787(**)	.683(**)	.682(**)	.663(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93
Our ERP enhances organizational learning and recall for individual worker	Correlation Coefficient	.760(**)	.764(**)	.700(**)	.751(**)	.652(**)	.647(**)	.621(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93
Our ERP improves individual productivity	Correlation Coefficient	.762(**)	.789(**)	.697(**)	.814(**)	.704(**)	.684(**)	.742(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93
Our ERP is beneficial for individual's tasks	Correlation Coefficient	.654(**)	.716(**)	.930(**)	.736(**)	.909(**)	.864(**)	.688(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93
Our ERP enhances higher-quality of decision making	Correlation Coefficient	.650(**)	.722(**)	.880(**)	.719(**)	.920(**)	.830(**)	.732(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93
Our ERP saves time for individual tasks and duties	Correlation Coefficient	.553(**)	.601(**)	.680(**)	.604(**)	.650(**)	.624(**)	.578(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93

** Correlation is significant at the 0.01 level (2-tailed).

Table 17: Correlation between ERP workgroup Impact and ERP organizational impact dimensions using Kendall's tau_b statistic.

		Our ERP reduces organizational costs	Our ERP improves overall productivity	Our ERP enables e-business / e-commerce	Our ERP provides us with competitive advantage	Our ERP increases customer service/ satisfaction	Our ERP facilitates business process change	Our ERP supports decision making	Our ERP allows for better use of organizational data resource
Our ERP helps to improve workers' participation in the organization	Correlation Coefficient	.737(**)	.780(**)	.742(**)	.648(**)	.420(**)	.631(**)	.641(**)	.725(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP improves organizational-wide communication	Correlation Coefficient	.853(**)	.786(**)	.804(**)	.743(**)	.549(**)	.668(**)	.778(**)	.785(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP improves inter-departmental coordination	Correlation Coefficient	.744(**)	.759(**)	.801(**)	.726(**)	.622(**)	.770(**)	.737(**)	.733(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP creates a sense of responsibility	Correlation Coefficient	.634(**)	.752(**)	.689(**)	.712(**)	.587(**)	.668(**)	.718(**)	.734(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP improves the efficiency of sub-units in the organization	Correlation Coefficient	.890(**)	.765(**)	.809(**)	.759(**)	.651(**)	.756(**)	.780(**)	.743(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP improves	Correlation	.674(**)	.789(**)	.821(**)	.733(**)	.616(**)	.696(**)	.719(**)	.747(**)

work-groups productivity	Coefficient								
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93
Our ERP enhances solution effectiveness	Correlation Coefficient	.798(**)	.694(**)	.744(**)	.739(**)	.591(**)	.614(**)	.697(**)	.764(**)
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000
	N	93	93	93	93	93	93	93	93

** Correlation is significant at the 0.01 level (2-tailed).

4.4 Assessing the Measurement and Structural Model

As aforementioned, guided by Ifinedo (2007), this study uses structural equation modeling (SEM) to examine the relationships between the constructs and takes the Partial Least Squares (PLS) approach. Chin (1998) notes that PLS approach is not sensitive to normality of data and can accommodate small-sized samples and it's for this reason this study uses it.

PLS recognizes two components of a casual model: the measurement model and the structural model. In measurement models PLS demonstrates the construct validity of the research instrument (i.e. how well the instrument measures what it purports to measure) and gives information as to how well the theoretical model predicts the hypothesized paths or relationships in structural models (Chin (1998), Ifinedo (2007)).

PLS software provides the squared multiple correlations (R^2) for each endogenous construct in the model and the path coefficients. R^2 indicates the percentage of a constructs variance in the model while the path coefficients indicate the strengths of relationships between constructs (Chin 1998 and Ifinedo 2007).

As shown in figure 54, the path coefficients (β) of *system quality* and *information quality* are 0.223 and 0.099 respectively. The introduced work reorganization dimension has a path coefficient (β) of 0.654. This implies that *system quality, information quality* and *work reorganization* have strong relationships with the individual impact dimension. With *work reorganization* dimension included the R^2 of the three constructs is 92% meaning that they account for 92% in the variation of *individual impact* of ERP systems. Without work *reorganization* dimension included the R^2 of the *system quality* and *information quality* dimensions is 67% meaning that they account for 67% in the variation of *individual impact* of ERP systems and this shows *work reorganization* dimension explains a significant variance on *individual impact* dimension of ERP systems. Consistent with Ifinedo (2007) there is a strong relationship between *individual impact* and *workgroup impact* ($\beta = 0.97$). Individual impact alongside other dimensions and with work *reorganization* dimension included account for 94% of the variation in the workgroup construct. Also work group dimension has a significant relationship with organizational impact ($\beta = 0.94$) which is also consistent with Ifinedo (2007). Together, all the constructs explained 90% of the variance in the structural model. This supports the five hypothesis of this study which are:-

- H1: ERP System Quality significantly affects impact ERPs have on individual

- H2: Quality of Information resulting from ERP systems will significantly affect the impact ERPs have on Individual
- H3: Work reorganization resulting from ERP systems significantly affects impact ERPs have on Individual
- H4: Impact of ERPs on Individual significantly affects Impact ERPs have on the Workgroups
- H5: Impact of ERPs on workgroups significantly affects the overall Impact ERPs have on the organization

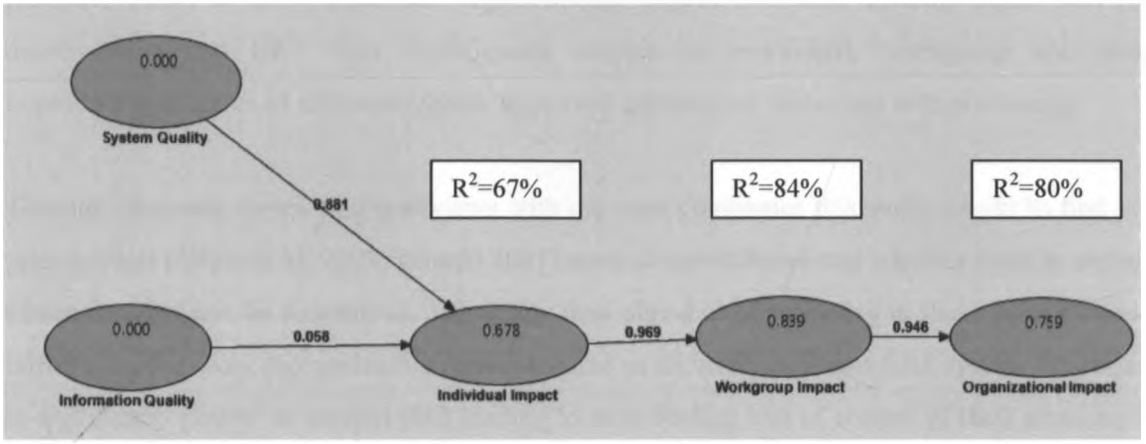


Figure 59: Relationships among paths in the ERP system success model without the work reorganization

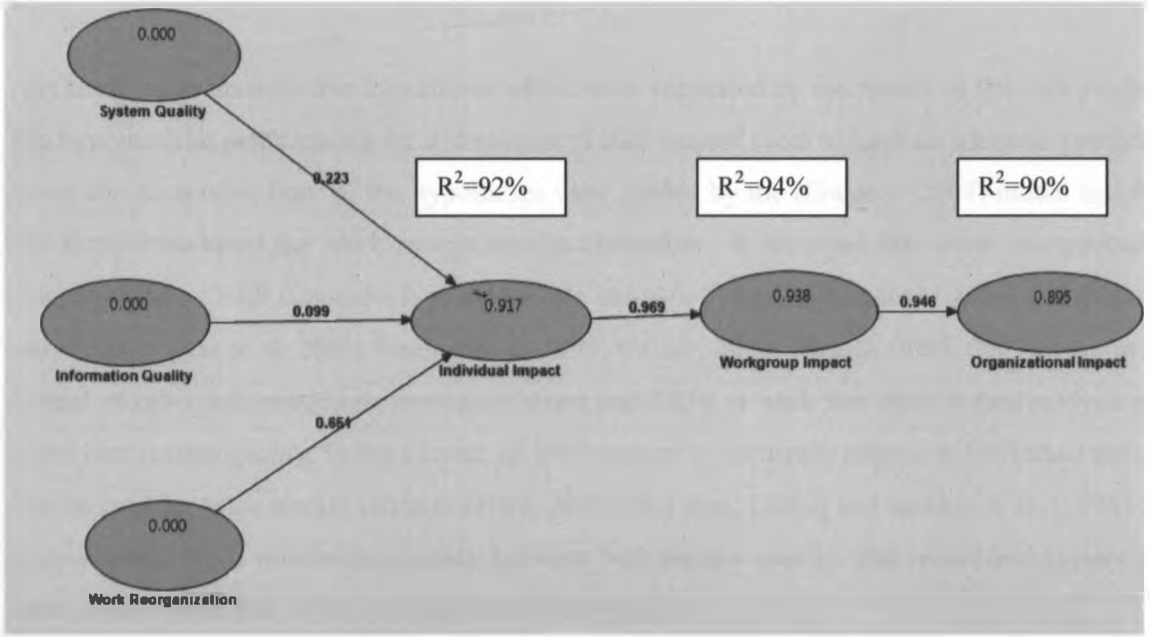


Figure 60: Relationships among paths in the ERP system success model including the work reorganization

CHAPTER 5
CONCLUSIONS

5.0 Conclusion

The objective of this study was to assess the impact of work reorganization brought about by ERP implementation on the individual and consequently on the organization as a whole and to seek a way of incorporating this dimension into the existing models. As aforementioned Enterprise Resource Planning systems are highly complex information systems that have potentially dramatic impacts on many aspects of work and organization. As Dery et al. (2006) noted very little literature exists to show work and organizational impact that ERP systems have. This study demonstrates that ERP does significantly impact on individual, workgroup and overall organization in terms of efficiency gains, improved information flows and data processing.

Through literature review and interviews with our case companies this study sought to find out if prior models (Gable et al. 2003; Ifinedo 2007) were comprehensive and whether there is any other dimension that can be introduced. This study thus aimed at contributing to these prior studies by introducing the work reorganization dimension and as the analysis shows ERP system adoption led to significant 'power' or control shift leading to most feeling loss of control of their previous way of doing things. This was brought about mainly by the centralized information and the standardized processes that resulted from ERP system. It also emerged that process parameters for changing aspects like job positions, job descriptions and lines of reporting were and are still greatly being centered on the ERP system processes.

This study came up with five hypotheses which were supported by the results of the data analysis. The hypothesized paths among the dimensions of ERP impact seem to have an adequate predictive power for the model. Four of the hypotheses were guided by the Ifinedo's (2007) model and then this study introduced the work reorganization dimension. It emerged that *work reorganization* brought about by ERP is positively related to the *individual impact*. As widely tested and shown in other studies (Rai et al. 2002; Seddon et al. 1994; Calisir, 2004; Ifinedo, 2006, 2007) done in the context of other information technology systems and ERPs as well, this study's data analysis also found that *system quality,* in the context of ERP system is positively related to *individual impact.* Also as in other prior studies (Ifinedo (2006, 2007), Rai et al. (2002) and Seddon et al. (1994), the study shows that a relationship exists between *information quality* and *individual impact* and *workgroup impact* and *organizational impact* in that order.

This study will assist ERP adopting firms with no formal means of conducting ERPs success measurement, evaluation or assessment by providing a comprehensive list of dimensions and measures that could be valuable in this regard. The improved ERPs measurement model can also be used in two phases. The "information quality" and "system quality" dimensions may be used during periods preceding acquisition and the use the other dimensions "work reorganization, individual, workgroups and organization impact dimensions" after adopting ERPs in order to assess impact of ERP to the individual, workgroups and in the overall organization.

5.1 Limitations of this study and suggestions for further work

This study used subjective and perceptual measures and it is likely that objective measures of ERP impact, which are usually financially centered (e.g. Return on Investment, profit or productivity measures) might yield a result different from this study.

Future studies may complement this study by using a discourse analytic approach to measure the social impact of ERPs. Future studies might also strive to develop an appropriate scale to assess ERP systems success for adopting organizations.

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APPENDIX 1: QUESTIONNAIRE

A Work and Organization Based Approach to Assessing Impact of Enterprise Resource Planning Systems [ERPs]

QUESTIONNAIRE

This questionnaire is designed for the purpose of gathering information to assess the impact of Enterprise Resource Planning Systems (ERPs) in your organization. Its organized in six sections namely; system quality, information quality, work reorganization, individual impact, workgroup impact and organizational impact

---

Name:_____

Organisation:_____

Department:_____

Job Position: Senior management ☐ Middle Management ☐ Non Management ☐

SYSTEM QUALITY DIMENSION

1. Our ERP has accurate data
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

2. Our ERP is flexible
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

3. Our ERP is easy to use

- ☐ Strongly agree
- ☐ Agree somewhat
- ☐ Agree
- ☐ Neither agree or disagree
- ☐ Disagree somewhat
- ☐ Disagree
- ☐ Strongly Disagree

Elaborate further (optional)

4. Our ERP is easy to learn
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

5. Our ERP is reliable
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

6. Our ERP allows data integration
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

7. Our ERP allows for customization
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

8. Our ERP is efficient
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

9. Our ERP has good features
   - ☐ Strongly agree
   - ☐ Agree somewhat
   - ☐ Agree
   - ☐ Neither agree or disagree
   - ☐ Disagree somewhat
   - ☐ Disagree
   - ☐ Strongly Disagree

   Elaborate further (optional)

10. Our ERP allows for integration with other IT systems
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

11. Our ERP meets users' requirements
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

INFORMATION QUALITY DIMENSION

12. Our ERP database contents is up-to-date
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

13. Our ERP has timely information
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

14. The information on our ERP is understandable
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree

- ☐ Neither agree or disagree
- ☐ Disagree somewhat
- ☐ Disagree
- ☐ Strongly Disagree

Elaborate further (optional)

15. The information on our ERP is important
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

16. The information on our ERP is brief
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

17. The information on our ERP is relevant
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

18. The information on our ERP is usable
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

19. The information on our ERP is available
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

WORK REORGANIZATION DIMENSION

20. ERP implementation resulted in loss of control of day to day aspects of my work
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

21. ERP implementation reduced frequency of interaction with my colleagues
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

22. ERP implementation led to change of my job description
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

23. ERP implementation led to change of my position in the organization structure
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

24. ERP implementation led to change to my lines of reporting
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

INDIVIDUAL IMPACT DIMENSION

25. Our ERP enhances individual creativity
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat

- ☐ Disagree
- ☐ Strongly Disagree

Elaborate further (optional)

26. Our ERP enhances organizational learning and recall for individual worker
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

27. Our ERP improves individual productivity
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

28. Our ERP is beneficial for individual's tasks
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

29. Our ERP enhances higher-quality of decision making
    - ☐ Strongly agree

- ☐ Agree somewhat
- ☐ Agree
- ☐ Neither agree or disagree
- ☐ Disagree somewhat
- ☐ Disagree
- ☐ Strongly Disagree

Elaborate further (optional)

30. Our ERP saves time for individual tasks and duties
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

WORKGROUP IMPACT DIMENSION

31. Our ERP helps to improve workers' participation in the organization
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

32. Our ERP improves organizational-wide communication
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

33. Our ERP improves inter-departmental coordination
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

34. Our ERP creates a sense of responsibility
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

35. Our ERP improves the efficiency of sub-units in the organization
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

36. Our ERP improves work-groups productivity
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

37. Our ERP enhances solution effectiveness
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

ERP ORGANIZATIONAL IMPACT DIMENSION

38. Our ERP reduces organizational costs
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

39. Our ERP improves overall productivity
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

40. Our ERP enables e-business / e-commerce
    - ☐ Strongly agree

- ☐ Agree somewhat
- ☐ Agree
- ☐ Neither agree or disagree
- ☐ Disagree somewhat
- ☐ Disagree
- ☐ Strongly Disagree

Elaborate further (optional)

41. Our ERP provides us with competitive advantage
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

42. Our ERP increases customer service/ satisfaction
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

43. Our ERP facilitates business process change
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

    Elaborate further (optional)

44. Our ERP supports decision making
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)

45. Our ERP allows for better use of organizational data resource
    - ☐ Strongly agree
    - ☐ Agree somewhat
    - ☐ Agree
    - ☐ Neither agree or disagree
    - ☐ Disagree somewhat
    - ☐ Disagree
    - ☐ Strongly Disagree

Elaborate further (optional)