The Critical Success Factors Of The ERP System Project: A Meta-Analysis Methodology

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ABSTRACT

Many articles have been written on enterprise resource planning success in the last two decades in both the public and private sector. An important number of empirical studies attempt to delineate the steps of ERP project integration and their specificities. These research works can be divided into two principal phases: the implementation and the post-implementation. The complex nature of the ERP system and its implementation stages lead us to investigate about the critical success factors mentioned in both phases of integration. Recently, several studies have tried to assess the success of ERP system and highlight the CSF's based on some theoretical models. This study uses a meta-analysis methodology to highlight the principal factors leading to ERP success, and it evaluates the weight of CSF's in the process of implementing the ERP project. Based on the best studies published in the last years about ERP success, we conduct this research to determine the most important factors highly correlated with the ERP success. Eleven CSF's are identified in our meta-analysis and classified according to their significant importance based on the correlation coefficients finding in 32 articles focus only on the ERP system. Some criteria were selected to choose studies such as: Sample size, the availability of correlation coefficient finding (quantitative empirical data), the availability of reliable constructs (Cronbach's alpha), and the measurement scale of each factor.

Keywords: ERP System; Meta-Analysis; Performance; Critical Success Factors

INTRODUCTION

More than 20 years ago, one of the most important information systems software appeared; the beginning of the 90's was characterized by the emergence of ERP system,[1] considered as a strategic weapon for many companies around the world. The investment in this kind of project is under increasing scrutiny and pressure to justify their value and contribution to the performance, quality, and competitiveness of organizations (Gable et al., 2003). Currently, and after approximately two decades, all the largest business companies are now equipped with the ERP system in order to follow the environment change and business development. The integration of this project is considered as one of the most important challenges for the top management, project manager, ERP consultant, and vendor at different levels of the organization, to be able to maximize its appropriation. The ERP integration requires large investment, and it is associated with many problems in the implementation phase (Markus & Tanis, 2000). Despite the substantial investments made by organizations, its success had been minor (Davenport, 1998; Davis, 1989b; Gable et al., 2003; Sedera & Gable, 2010). In the literature review, many theoretical researches attempt to develop models to evaluate the information systems success. However, these models are not entirely appropriate for measuring ERP system success (Gable et al., 2003) for many reasons such as its specificities, characteristics, and complexity of implementation. The organization must support and manage the change introduced by the ERP system, because its integration needs an important reorganization and transformation in the business process, at both strategic and technical level. In many cases, this resistance is

[1] ERP System: Enterprise Resource Planning is defined as customizable, standard application software, which includes integrated business solutions for the core processes (Rosemann & Wiese, 1999).

considered as a major risk of ERP project implementation. The organization Fit is one of the principal factors leading to the implementation success. The resistance of change by the organization, partially because potential users resist the change; Kwahk and Lee (2008) highlight that the readiness of change was found to be enhanced by two principal factors: organizational commitment and perceived personal competence.

Before the evaluation of the ERP system, a framework has to be fixed and the characteristics of the system need to be taken into consideration. However, the context should dictate the appropriate specification and application of the ERP system (DeLone & McLean, 2003, 1992). Although, many success variables are proposed by researchers to evaluate the ERP success and attempt to explain the causal and the process model adapted to propose their constructs and measurement variables. This question about the causal and process model has been discussed in the literature about the IS evaluation. The process model suggests that an IS is first created, containing various features, which can be characterized as exhibiting various degrees of system and information quality. In contrast, a causal model studies the covariance of the success dimensions to determinate if there exist a causal relationship among them (DeLone & McLean, 2003).

To evaluate their information systems, organizations require appropriate methods and tools (Irani, 2002; Uwizeyemungu & Raymond, 2010), they propose a new qualitative method for the ex-post evaluation of ERP system based on one hand on the organizational performance, and on the other hand on the automationed, informational and transformational effects that result from the integration and the use of the system. Their approach is based on a process model that takes into account at the same time practitioners' dimension of evaluation, and researchers' conception (Irani & Love, 2008). This phenomenon of IS evaluation is complicated and multifaceted; it must be examined from many perspectives (Song & Letch, 2012) and take into account different stakeholders involvement (Irani & Love, 2008; Irani et al., 2014; Stefanou, 2001).

A CCP proposition could be considered as an important framework to assess the success of ERP system because this framework integrates three major dimensions of evaluation: content, context and process (Irani & Love, 2008; Irani, 2002; Song & Letch, 2012). This new approach of evaluation answers three main questions: Firstly, what is being measured (content) based on a socio-technological paradigm? Secondly, why and who of IS evaluation to be considered (context)? And thirdly how will it be undertaken? Many instruments could be used to answer this question like, cost benefits, ROI,[2] user satisfaction that could be classified as a subjective evaluation approach.

According to the ERP evaluation success, a new framework of ex-ante evaluation was proposed by Stefanou (2001) to evaluate the ERP software. This framework includes in the same time behavioral, technological, and organizational perspective to evaluate the ERP software which is considered as a complex system (Irani, 2002; Stefanou, 2001). This step of success evaluation could be classified in the pre-implementation phase of the ERP integration process. It takes into account the selection process of the appropriate ERP software and all variables and criteria to select the most suitable one. The process of selection based on the one hand on both financial and non-financial approach and on the other hand it combines qualitative and quantitative measures (Stefanou, 2001). Relating to life-cycle product, the evolution of ERP integration process follows three phases: pre-implementation, implementation, and post-implementation. However, in this study we focus our classification of CSF's on two principal phases: First, the success factors according to implementation phase (Koh et al., 2011; Ngai et al., 2008). Secondly, success factors of ERP post-implementation project (Nicolaou & Bhattacharya, 2006). We include both ex-ante and ex-post evaluation in to ERP success because it is considered as a process that involves CSF's throughout the ERP life-cycle.

This research paper will start with a presentation of the our theoretical model developed from the different frameworks, models and approaches discussed by searchers in the IS Evaluation success (Davis, 1989b; DeLone & McLean, 2003, 1992; Gable et al., 2003; Ifinedo & Nahar, 2006; Irani & Love, 2008; Kaplan & Norton, 1992; Rosemann & Wiese, 1999; Seddon, 1997; Tsai et al., 2006); this theoretical model is based on three main theories: Firstly, the mathematical theory of communication (Weaver & Shannon, 1949) used by Delone and McLean to develop their model about information success to explain the three levels that must be taken into account to evaluate IS success (technical level, semantic level, and effectiveness level). Secondly, the diffusion of innovations theory

[2] ROI: Return on investment

(Rogers, 1983) mobilized by Bradford and Florin (2003) to explain the role of the diffusion of innovation on the ERP implementation success that will be used to involve and classify three principal factors in the conceptual model: technological; organizational, and environmental. Thirdly, the Adaptive Structuration Theory (DeSanctis & Poole, 1994) was used to explain the interaction between the variables (factors) and the performance in three levels: individual, workgroup, and organizational performance.

We will expose our conceptual model and highlight the principal success factors identified in both theoretical models and empirical studies. After that, we will explain how these CSF's are classified taking into account the theoretical background in order to justify our conceptual perception. Then, we will explain the goal of our study and why a meta-analysis methodology was adopted. The methodology that we chose is a quantitative meta-analysis to identify the most significant factors that contribute to the ERP success in the different phases, depending on one side on Hunter et al.'s (1982) meta-analysis technique, and on the other side Lipsey and Wilson's (2004) practical meta-analysis. In this part, will we justify the use of this methodology and its contribution as the first study is interested in CSF's of the ERP system success. Later, we will examine the selection procedure of empirical studies and why our intention focuses only on studies published in the information system journals. Last, we will show both the process studies selection and treatment process of the effect size of every factor and its coefficient of correlation and its weight of success contribution.

Despite, meta-analysis is often criticized as a method mixing apples and oranges, but in this case we will choose only one choice to increase the reliability of the result. The meta-analysis method gives us a quantitative output, and it could compute the effect of variables and their contribution in the organizational performance. This study will give us the opportunity to design a new categorization of the CSF's and the value of each one in the ERP process based on the best published papers in the last decade.

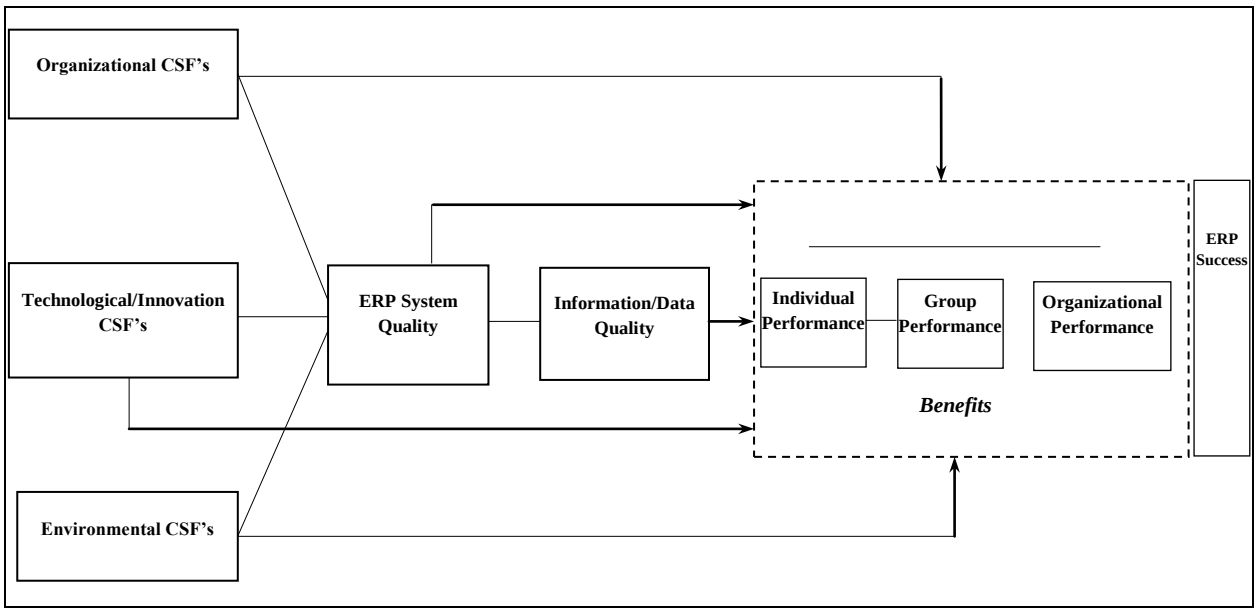

Figure 1: Theoretical Model

CRITICAL SUCCESS FACTORS OF ERP SYSTEM

Many critical factors were proposed to evaluate the success of the ERP system with different categories and taxonomies (Al-Mashari et al., 2003; Finney & Corbett, 2007; Fui-hoon nah & Delgado, 2006; Garcia-Sanchez & Pérez-Bernal, 2007; Plant & Willcocks, 2007; Somers & Nelson, 2001; Zhang et al., 2002). This IS project success is defined by Lyytinen and Hirscheim (1987) as:

- Correspondence success, where there is a match between IT systems and specific planned objectives.
- Process success, when IT project is completed within time and budget.

- Interaction success, when users' attitudes towards IT are positive.
- Expectation success, where IT systems match users' expectation.

The literature review about the success of the ERP system has shown an important number of CSF's. Some factors are present in the majority of the empirical studies but some others are not. Those present are considered as the most critical in the ERP system project success. Some researchers were interested in the following factors:

WGI: Myers et al. (1997) claimed that any system success model should include workgroup impact (WGI) and consider this factor as the contributions made by the teams/groups toward organizational productivity. The workgroup impact is an important stage between the individual and the organizational impacts, many organizations place a greater emphasis on the role of teams in the workplace (Ifinedo et al., 2010; Myers et al., 1997).

II: Individual impact is one of the most important factors determining the acceptance and the adoption of the technology by users. Thus, this factor is the most difficult to define in a non-ambiguous fashion (DeLone & McLean, 1992). Many acceptance technology models are developed to investigate the question about the individual impact on the information system (Davis, 1989; Venkatesh & Davis, 2000; Venkatesh et al., 2003). In the ERP system, this factor is determinant to perform the ERP project integration. Users' involvement, competence of users, training of users, users' resistance of change, user competency, and user knowledge of the system (Gorla & Lin, 2010) are considered as individual factors in the ERP system success that must be taken into account by top management in the ERP system project.

OI: Organizational impact could be considered as a reciprocal impact between the organization and the technology. The first impact focuses on the organizational resistance, readiness of change, and organizational fit with the ERP system. The second impact could be explained by the contribution of the technology on the organizational performance improvement in operational tactical and strategic levels.

SQ: System quality plays an important role in the information system success. This quality could be defined in terms of many attributes such as, data accuracy, database contents, ease of use, ease of learning, convenience of access, usefulness of use, realization of users' requirements, system accuracy, system flexibility, system reliability, system integration, system sophistication, system features and functions, integration of system, system efficiency, resources utilization, response time, and turnaround time (DeLone & McLean, 1992). Software quality could be defined in terms of two main types of product characteristics: external quality such as, usability reliability, ease of use and usefulness, and internal quality, such as, software structure and complexity (Gorla & Lin, 2010).

IQ: The growth of data warehouse and the direct access of information by managers and information system users increase the need for, high quality information in organizations. To assess the quality of the information there are four main dimensions: Intrinsic IQ, Contextual IQ, Representational IQ, and Accessibility IQ (Lee et al., 2002). This information quality is considered by DeLone and McLean (1992) as a product of the information system that could be named IS output. They propose many criteria to measure the IQ such as, accuracy, output timeliness, reliability, completeness, relevance, precision, currency, accessibility, and adaptability.

TMS: Top Management Support is one of the most widely cited CSF's (Finney & Corbett, 2007). This factor refers to the commitment of leadership to the diffusion of innovations (Somers & Nelson, 2001) and is considered as the most critical factors in organizations embarking on ERP implementation (Al-Mashari et al., 2003). The decision to implement an ERP system is taken at the high level of organizational hierarchy, the senior management team input is crucial in the process of selecting of suitable vendor. The role of the leadership support and commitment does not end in this step of ERP system selecting, but must extend to the full implementation project (Al-Mashari et al., 2003). This factor is critical because management make fast and effective decisions, resolve conflicts, bring everyone to the same thinking to promote company-wide acceptance of the project, and build cooperation among the diverse groups in the organization (Sternad & Bobek, 2012).

VCQ: The vendor/consultant service quality could be understood from many angles of attack such as: the vendor/consumer partnerships (Somers & Nelson, 2001); the knowledge and capabilities of the consultant (Sternad

& Bobek, 2012); the communication and cooperation between the different stakeholders: client, consultant, and vendor (Finney & Corbett, 2007); vendor transfers of knowledge, documents, services, and support. Both vendor and consultant quality were grouped together because they present an external source of expertise to the organization regarding ERP system implementation (Ifinedo & Nahar, 2006). This factor could be considered as an external knowledge factor (Sedera & Gable, 2010), that contributes to perform the ERP integration project throughout the product life cycle (implementation, upgrade, new version integration…). The VCQ factor can substitute the SQ (Service Quality) proposed by DeLone and McLean (2003) that must be added to the IS success model. The SERVQUAL concept is defined by Tsai et al. (2012) as the overall support delivered by the service supplier; they claimed that a poor user support can translate into lost costumers and lost sales. This concept is developed in the marketing to measure the service quality to evaluate the degree of users' satisfaction using five main dimensions (Tsai et al., 2012):

(1) Tangibles: Suppliers and consultants provide up-to-date hardware and software.
(2) Reliability: Suppliers and consultants are reliable.
(3) Responsiveness: Suppliers and consultants provide prompt service to users.
(4) Assurance: Suppliers and consultants have the knowledge to do their job better.
(5) Empathy: Suppliers and consultants have users' best interests at heart.

The main constructs used to measure the service quality in this study are:

- Vendor and consultant quality (Ehie & Madsen, 2005; Ifinedo & Nahar, 2006)
- Consulting services (Wang et al., 2008)
- External support (Zhu et al., 2010)
- Service quality (Chou & Hong, 2013)
- Knowledge management competencies (Sedera & Gable, 2010)
- External information acquisition for ERP adoption (Bernroider et al., 2014)

TED: A particular challenge in the ERP implementation is to select an appropriate plan for end-user training and education (Al-Mashari et al., 2003). Everyone who uses ERP systems needs to be trained on how they work and how they relate to the business process early on the implementation phase (Somers & Nelson, 2001). Many ERP system adopters need the help of the consultants during the implementation project; this transfer of consultant's knowledge to internal employees is crucial to success and facilitates the ERP system adoption (Davenport, 1998). However, inadequate training and education could be considered as a significant reason for many ERP system failures (Al-Mashari et al., 2003; Bradford & Florin, 2003; Umble et al., 2003).

BPR: Business process reengineering, to benefit from all the advantages and best practices provided by the ERP system, business process redesign and change is required, because ERP systems are essentially developed to improve business processes such as manufacturing, purchasing, or distribution (Al-Mashari et al., 2003). To achieve the greatest benefits provided by the ERP system, it is imperative that the business processes are aligned with the new system (Somers & Nelson, 2001). The new organizational business model after the business process reengineering is an enabling factor that contributes to the ERP success. The main appellations used to indicate the BPR:

- Business process reengineering (Bradford & Florin, 2003; Ehie & Madsen, 2005; Ram et al., 2013a)
- Business process improvement (Bernroider, 2008; Bernroider et al., 2014; Law & Ngai, 2007)
- Business process adaptation (Hong & Kim, 2002)
- Business process change (Velcu, 2010)

PM: Project Management concerns all the human, technological, and financial resources used to perform the ERP system project respecting budget and schedule estimations. To manage successfully the ERP integration, project managers must be capable both in strategic and tactical project management activities (Al-Mashari et al., 2003). This factor refers to the ongoing management of the implementation plan. It involves not only the planning stages, but also the allocating of responsibilities to various players (Finney & Corbett, 2007). The project

management needs to establish a steering committee comprised of senior management, senior project management, and ERP end users that should be involved in all the ERP integration phases (Finney & Corbett, 2007; Somers & Nelson, 2001).

ERP/F: ERP Fit, this factor includes many constructs such as system integration (Al-Mashari et al., 2003; Grant et al., 2013; Ram et al., 2013b), system configuration (Zhu et al., 2010), customization (Somers & Nelson, 2001; Sternad & Bobek, 2012), technical compatibility (Bradford & Florin, 2003), and ERP Fit and alignment (Bernroider et al., 2014; Wang & Chen, 2006). The ERP system integration requires some modifications that should take into consideration both ERP system features and organization specificities; this fit between the organization and the ERP system is a critical factor of success. The integrative design of the ERP systems increases the complexity involved in source code modification (Sternad & Bobek, 2012). Organizations seek competitive advantage by aligning with other organizations, usually for their non-core business activities, and thus may intend to integrate ERP with partner systems (Ram et al., 2013a). System integration/configuration is considered as a CSF's at the deployment stage of ERP (Al-Mashari et al., 2003). This result reinforces the importance of ensuring that all the ERP modules are interfaced for the seamless operation of ERP system and allow successful implementation (Ram et al., 2013a).

In the following table we expose all the critical success factors identified in 32 articles selected for our mete-analysis. In the columns we find the eleven CSF's most cited by the researchers in the last ten years and in the lines, researchers who have studied quantitatively these factors. We can see that in one study many factors may be treated.

Table 1: Critical Success Factors

Authors / CSF's	Top Management involvement/ Leadership Involvement / Top Management Support TMS	Vendor and Consultant Competencies/Quality (External Support)/ Consultant and Vendor Service Quality VCQ	Training and Education TED	Business Process Reengineering (BP Improvement/Change) BPR	Project Management/ ERP Project Management PM	Work Group Impact WGI	Individual Impact/ User Involvement/ User perceived usefulness II	ERP Information Quality/ Output Quality IQ	Organizational Impact/ Organizational Fit/ Organizational objectives consensus OI	ERP System Quality SQ	System Integration/ System Configuration/Customization/ Fit/ Adaptation/ Technical Compatibility ERP Fit
(Gable et al., 2003)							✓	✓	✓	✓	
(Ifinedo & Nahar, 2006)		✓				✓	✓	✓	✓	✓	
(Ram et al., 2013a) (a)			✓	✓	✓						✓
(Ifinedo et al., 2010)		✓				✓	✓	✓	✓	✓	
(Law & Ngai, 2007)				✓							
(Candra, 2012)							✓	✓	✓	✓	
(Zhu et al., 2010)	✓	✓			✓				✓		✓
(Hong & Kim, 2002)				✓					✓		
(Velcu, 2010)				✓	✓						
(Ehie & Madsen, 2005)	✓	✓		✓	✓						
(Bernroider, 2008)				✓				✓			
(Sedera & Gable, 2010)		✓					✓		✓	✓	
(Bradford & Florin, 2003)	✓		✓	✓					✓		✓
(Chou & Hong, 2013)		✓					✓	✓		✓	
(Ifinedo, 2011)							✓	✓		✓	
(Ram et al., 2013b) (b)			✓	✓	✓						✓
(Wang et al., 2008)	✓	✓			✓			✓			
(Yoon, 2009)								✓			
(Choi et al., 2007)			✓							✓	
(Scott & Walczak, 2009)	✓	✓									

Table 1 cont.

(Amoako-Gyampah, 2007)										✓	
(Wang & Chen, 2006)											✓
(Chien et al., 2007)					✓						
(Tsai et al., 2012)		✓					✓			✓	
(Kwahk & Lee, 2008)	✓									✓	
(Chou & Chang, 2008)									✓		
(Grant et al., 2013)									✓		✓
(Sun et al., 2009)										✓	
(Bernroider et al., 2014)	✓	✓	✓	✓							✓
(Lapiedra et al., 2011)		✓									
(Chung et al., 2008)	✓	✓						✓		✓	
(Shih & Huang, 2009)	✓									✓	✓

RESEARCH METHODOLOGY

The literature review related to the success of ERP system provides an important number of empirical studies. Throughout the past two decades, researchers have investigated the question about the determinants of the ERP system success in order to understand better their impacts both on organizational and individual performance. The divergent results of studies about the CSF's lead us to investigate the quantitative review to determine the effect size magnitude (Lipsey & Wilson, 2004) of each factor in the success process of the ERP System and its benefit in both practice and research. The most appropriate methodology to answer this question is not to add a new study with a new result but to combine all the extant studies in a meta-analysis cumulating all research findings (Hunter et al., 1982). The choice of this methodology is motivated by both the nature of the extant results studies and the feasibility of quantifying the findings results in one study.

Meta-analysis is one of many ways to summarize, integrate, and interpret selected sets of scholarly works in various fields (Lipsey & Wilson, 2004) like, psychology, medicine, and recently in management (Chau, 1999; King & He, 2006; Petter & McLean, 2009; Wu et al., 2011, Laroche & Soulez, 2012; Wu & Lederer, 2009). The studies that we can use in meta-analysis are those using a quantitative measurement of variables and reporting descriptive or inferential statistics that summarize the resulting data. The meta-analysis is a technique for encoding and analyzing the statistics that summarize research findings as they are typically presented in research reports (Lipsey & Wilson, 2004). The meta-analysis should use an effect size statistic that provides appropriate standardization for the particular research form design of quantitative finding, variables, and operationalization presented in the set of studies under investigations (Lipsey & Wilson, 2004).

The process of meta-analysis is defined by Glass as a composite process: Starting by cumulating descriptive statistics across the studies, coding study characteristics, and finally the regression of study outcome onto the coded study characteristics (Hunter et al., 1982, p. 32). In the course of doing meta-analysis, the steps would be: (1) search for and gather studies, (2) extract information from the studies, and (3) cumulate the information extracted; these are the main three steps of the meta-analysis process as defined by Hunter et al. (1982).

Strengths of Meta-Analysis

Using a meta-analysis to summarize and analyze results of research studies is more reliable than conventional research reviewing techniques (Lipsey & Wilson, 2004); there are four main reasons that constitute the advantages of meta-analysis: Firstly, meta-analysis methodology imposes a useful discipline on the process of cumulating research results; secondly, the meta-analysis summarizes key study results in a way that they are more differentiated and sophisticated than the traditional review procedures; thirdly, meta-analysis is able to find effects or relationships that are obscured in other approaches to summarize research; fourthly, meta-analysis provides an organized manner of handling information from a huge number of study findings under review.

Identifying and Selecting Studies

The meta-analysis process starts by identifying studies. To identify these studies, we use both online databases accessible via our university and Google scholar as a supplementary tool for optionally adding other

studies that go unnoticed. Online databases used in our research are: Science Direct, JSTOR, Taylor & Francis, Wiley, and Springer link, but the majority of articles were found in Science Direct. The main subject of this step of meta-analysis process is to include as many published studies as possible to enhance the reliability of our result. In the process of identifying studies we fixed many criteria of research such as: keywords used in the article title and abstract, including only the studies published between 2002 and 2014, using the following keywords: ERP system success, CSF's, ERP system, performance, effectiveness, ERP benefits. These keywords are used in the advanced research option in the online databases using all the combinations possible. We also sought the studies that referred to IS Success model such as the DeLone & McLean model, TAM Model. We examined the references of each article for probably finding new studies.

After the first step of identifying studies using all possibilities to enhance the number of articles published in the period between 2002 and 2014, we selected only the articles that used a quantitative approach. Our meta-analysis includes studies according to two criteria: Firstly, the studies that reported the correlation coefficient; secondly we retained only the articles that treated the success of ERP System taking on consideration three levels of performance: individual, work group, and organizational performance. Taking into account these three levels of performance as a measurement criterion of the ERP System success that have been justified both theoretically and empirically by an important number of researchers. In the individual level, all studies that used TAM model assess the ERP Success in the individual impact using the following items: User satisfaction, individual performance, computer self-efficacy and user satisfaction, ERP efficacy usage and perceived usefulness. Studies based on DeLone & McLean Model use two levels of performance measurement, individual and organizational; some studies used the three level indicated above. Focusing on only one level of performance measurement was not possible for many reasons, the theoretical measurement model interested in ERP success take into account all the three levels (Gable et al., 2003; Ifinedo & Nahar, 2006; Ifinedo, 2011; Ifinedo et al., 2010; Sedera & Gable, 2010), thus the feature of ERP system must take into account the success evaluation process. The characteristic of the IS must be taken into consideration in the evaluation process (DeLone & McLean, 1992; Gable et al., 2003; Seddon, 1997).

We followed the process used in other meta-analysis in information system to develop our final database and for encoding studies selected to be summarized in our meta-analysis (e.g., Chau, 1999; King & He, 2006; Petter & McLean, 2009; Wu et al., 2011), hence we followed a procedure in a meta-analysis used in marketing which developed a conceptual model from the extant results (Kirca et al., 2005).

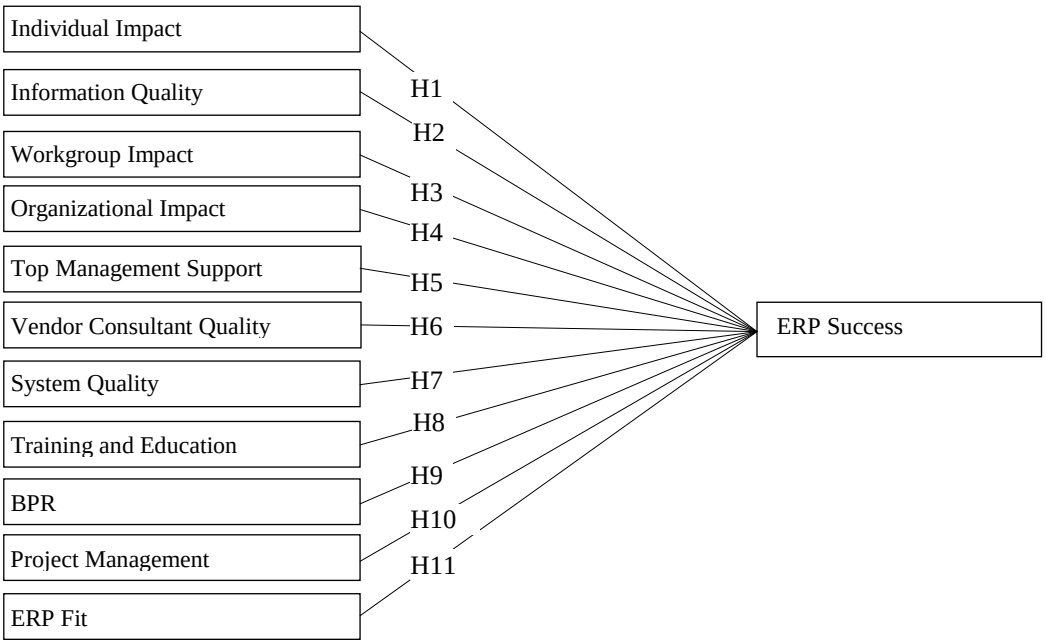

Figure 2: Hypothesized Model

The result of our first research before selecting studies:

Table 2: Publications by Journal

Journal Title	Publications
Information & Management	10
International Journal of Production Economics	8
International Journal of Information System	7
Computers in Industry	6
Procedia Technology	6
Computers in Human Behavior	5
European Journal of Operational Research	5
International Journal of Accounting Information...	5
The Journal of Strategic Information Systems	4
International Journal of Project Management	3
Information Systems	2
Decision Support Systems	2
Journal of Systems and Software	2
Advanced Engineering Informatics	1
Computer Standards & Interfaces	1
Human Resource Management Review	1
International Journal of Human-Computer Studies	1
The Journal of High Technology Management Research ...	1
Practical E-Manufacturing and Supply Chain Management	1
Journal of Information Technology Management	1
Social and Behavioral Sciences	1
International Journal of Information Management	1
Computers in Industry	1
Journal of Manufacturing Systems	1
The Service Industries Journal	1
Journal of Computing in Civil Engineering	1
Journal of Research and Practice in Information Technology	1
"International Conference on Information Systems"	1
	81

Table 3: The 32 Studies Selected for our Meta-Analysis

Information Management	8
Computers in Human Behavior	4
The Journal of Systems and Software	2
International Journal of Production Economics	2
International Journal of Project Management	2
Decision Support Systems	2
"International Conference on Information Systems"	1
Journal of Information Technology Management	1
Social and Behavioral Sciences	1
International Journal of Information Management	1
Computers in Industry	1
The Journal of Strategic Information System	1
International Journal of Accounting Information Systems	1
Journal of Manufacturing Systems	1
International Journal of Human Computer Studies	1
The Service Industries Journal	1
Journal of Computing in Civil Engineering	1
Journal of Research and Practice in Information Technology	1
Total	32

Tables (1, 2, 3) presented above summarize the articles used in the meta-analysis and classify them using three main criteria: topic, year of publication, and journal. Table 2 shows all the articles found in the first step of collecting studies and presents the result of our research using the following key words: ERP system, ERP system success, ERP system performance, and ERP CSF's. Table 3 presents only the articles including a quantitative methodology (correlation coefficient) needed to compute the effect size.

Coding Studies

This step is focused on the extraction of the information from each study selected. To accomplish this task we use an excel table with the coded study criteria (Hunter et al., 1982) such as the date, journal, authors, and sample size. We included as many criteria as possible in our database to lead our meta-analysis. We also carefully selected the measurement items of each construct. This step was critical because the constructs are not always measured by the same items, for example IQand SQ could be measured using different items; for this reason we used Cronbach's alpha or inter-item reliability scores for each construct (Chau, 1999; Petter & McLean, 2009).

$$\text{Cronbach's alpha } \alpha = \frac{k}{k-1}\left[1 - \frac{\sum \sigma_i^2}{\sigma_x^2}\right] \quad (1)$$

K indicates the number of items; $\sum \sigma_i^2$ is the sum of the variances of the items, and σ_x^2 is the variance of total score. In our case Cronbach's alpha is indicated in each study used in our meta-analysis.

When coding our finding results, we classified them into different categories, for example the geographic context: America, Asia, Europe, and Australia. The respondents function: ERP Users, ERP project Manager, Senior ERP Manager, CIO's, and some studies focus on various hierarchical levels of respondents. Two studies used in our research have taken into account students as respondents to assess the ERP success system; these two studies measure the individual performance level using the technology acceptance model (Davis, 1989b). Therefore, we classified the selected studies into two principal categories: public and private sector, and the two studies mentioned above are classified in the education sector because they were applied on students in two different universities.

Then 32 studies with 124 effect sizes have been encoded according to the criteria that have been fixed after the step of identifying and selecting study. Our initial research produced more than 80 papers, 48 of them were eliminated because they were not empirical studies with an effect size. We saved only the empirical studies that have provided a correlation coefficient, sample size, p-value, and reliability of constructs (using Cronbach's alpha).

Data Analysis

In the meta-analysis there are two main families of effects size: the ***r*** family and the ***d*** family; the two most important members of the former are Persons' product-moment correlations ***(r)*** and (***Zr***), Fisher's ***r*** to-***z*** transformation. The three most important members of the d family are Cohen's ***d***, Hedge's ***g***, and Glass's Δ (Rosenthal, 1995). To analyze our data, we had the possibility to follow one of the three meta-analysis techniques (Hedges-Olkin, Rosenthal-Rubin, and Hunter-Schmidt methods).

Recently many sophisticated meta-analysis software were developed to help researchers in their data analysis, like (Revman, CMA etc). The advantages of using meta-analysis software are: The possibility to create and customize graphics for interpretation and the facility for data entry.

However, in our meta-analysis we will use both conventional technique using Excel as a support for computing the effect size, and CMA software (Comprehensive Meta-Analysis software) to analyze our data and to confirm results that were found before. Based on articles published in IS (e.g., Petter & McLean, 2009) using a meta-analysis, the most appropriate technique selected to analyze our data was the Hunter and Schmidt technique. After gathering the correlation coefficient from each study, this technique appears to be the most appropriate because it is based on the correlation coefficient to compute the effect size.

Cumulating Correlations Across Studies (Hunter & Schmidt Technique)

This technique considers the correlation coefficient as a subject to two principal sources of error that can be eliminated at the level of meta-analysis: sampling error and error of measurement. In our meta-analysis we will eliminate both the sampling error and the error of measurement for each construct based on the criterion reliability (as reported using Cronbach's alpha).

Eliminating the Sampling Error

Hunter & Schmidt report that if the population correlation is assumed to be constant over studies, the best estimate of that correlation is not the sample mean across studies but a weighted average in which each correlation is weighted by the number of persons in that study. The formula to estimate the population correlation is:

$$\bar{r} = \frac{\sum[N_i r_i]}{\sum N_i} \quad (2)$$

where r_i is the correlation in study I and N_i is the number of people in study i. The corresponding variance across studies is the frequency weighted average squared error:

$$s_r^2 = \sigma_r^2 = \frac{\sum[N_i(r_i - \bar{r})^2]}{\sum N_i} \quad (3)$$

To compute the error variable e_i (sampling error in the sample correlation in study i.) we use the following formula:

$$r_i = \rho_i + e_i \quad (4)$$

and its variance:

$$\sigma_{e_i}^2 = \frac{(1-\rho_i^2)^2}{N_i - 1} \quad (5)$$

The error variance across studies is computed using the following formula:

$$\boldsymbol{\sigma_e^2} = \frac{\boldsymbol{(1-\bar{r}^2)^2 K}}{\boldsymbol{N}} \quad (6)$$

where K is the number of studies and $N = \sum N_I$ is the total sample size. And the error variance of the population correlation is computed with following formula:

$$\boldsymbol{\sigma_\rho^2 = \sigma_r^2 - \sigma_e^2} \quad (7)$$

After computing the variance, we then calculated 95% confidence interval of the correlation corrected only for the sampling error using the standard deviation (computing from the variance). Confidence intervals that don't include zero consider that the relationship is significant.

Confidence interval: $\bar{r} +/- 1.96\sigma_e$ (8)

Eliminating the Measurement Error

Variables in management science are not perfectly measured (Hunter et al., 1982). There is always an effect of error of measurement on the correlation between variables, the error of measurement automatically lowers the correlation coefficient, and this effect must be eliminated in the meta-analysis. To eliminate this effect the true measurement scores of both dependent and independent variables must be computed:

$$\rho = \frac{r_{corrected}}{\sqrt{reliability_x}\sqrt{reliability_y}} = \frac{\bar{r}_{xy}}{\sqrt{r_{xx}}\sqrt{r_{yy}}} \quad (9)$$

where, r̄ is the correlation corrected for the sampling error, $\sqrt{r_{xx}}$ is the reliability of the independent variable and $\sqrt{r_{yy}}$ is the reliability of the dependent variable.

Based on Petter and McLean's (2009) meta-analysis, another test must be computed; this test is a homogeneity test which determines if there is heterogeneity in the correlations in a meta-analysis, this heterogeneity, often suggests that an additional variable is creating the variance and affecting the effect size. To know if the studies are homogeneous, credibility interval must be determined using the corrected standard deviation using the following formula:

$$\sigma_{e_\rho}^2 = \frac{\sigma_e^2}{r_{xx}r_{yy}} \quad (10)$$

Lower Endpoint = $\frac{\bar{r}-1{,}96\,\sigma_e}{\sqrt{r_{xx}}\sqrt{r_{yy}}}$ and Upper Endpoint = $\frac{\bar{r}+1{,}96\sigma_e}{\sqrt{r_{xx}}\sqrt{r_{yy}}}$ (11)

Each study contains all the information to correct correlation for attenuation due to both sampling error and measurement error. At first we corrected the correlation for the sampling error, and then we computed the 95% confidence interval of the corrected correlation from the sampling error. Secondly we based ourselves on the reliability of both independent and dependent variable to compute the average of each one over studies using Cronbach's alpha as reported. After that, we compute the correlation corrected for measurement error (ρ) and its credibility interval using the formula mentioned above (11).

Meta-Analysis Result

The study presented in this work summarizes quantitatively the relationship between the CSF's and the ERP system success. After identifying the CSF's selected from empirically studies we classified them into three main taxonomy of significant magnitude, strong, moderate and weak.

Table 4: Meta-Analysis Results

Significant Magnitude	Meta-Analysis	CSF	N	K	ρ	Fz
Strong	H1	II	1559	10	0,845	0.932
	H2	IQ	1940	13	0,775	0.846
	H3	WGI	389	4	0,766	0.813
	H7	SQ	3545	19	0.724	0.780
Moderate	H4	OI	1611	13	0,635	0.760
	H5	TMS	1455	10	0,578	0.595
	H6	VCQ	2007	14	0,494	0.517
	H8	TED	960	6	0,460	0.435
	H9	BPR	1560	13	0,353	0.374
Weak	H10	PM	932	8	0,324	0.310
	H11	ERP/F	1594	11	0,305	0.304

Statistically significant at: $\rho < 0.0001$

One of the benefits of the meta-analysis methodology is its ability to classify the strength of the relationships between the constructs (Lipsey & Wilson, 2004; Petter & McLean, 2009). The result of this study shows that the most significant factors in the ERP process success are: the individual impact in the first position ($\rho = 0{,}845$; Fz = 0.932), the information quality ($\rho = 0.775$; Fz = 0.846); the workgroup impact ($\rho = 0.766$; Fz = 0.813), and the ERP system quality ($\rho = 0.724$; Fz = 0.780). All these factors are an important impact on the ERP success. However, the organizational impact, top management support, vendor and consultant quality, training and education and the business process factors have a moderate magnitude with successively ($\rho = 0.635$; Fz = 0.760) ($\rho = 0.578$; Fz = 0.595) ($\rho = 0.494$, Fz = 0.517); ($\rho = 0.460$, Fz = 0.435); ($\rho = 0.353$, Fz = 0.374). And, finally in the last position, project management and ERP/Fit factors with a weak magnitude ($\rho = 0.324$, Fz = 0.310; $\rho = 0.305$, Fz = 0.304). We found that there is a significant relationship between CSF's and the success of the ERP system; most of these relationships are strong or moderate.

Table 5: Excel Meta-Analysis Results

Hypothesis	K	$\sum N_i$	$\sum[N_i r_i]$	$\bar{r}$	$\sum[N_i(r_i - \bar{r})^2]$	σ_r^2	σ_r	σ_e^2	σ_e	95% Confidence interval	σ_ρ^2	σ_ρ	r_{xx}	r_{yy}	ρ	$\sigma_{e_\rho}^2$	σ_{e_ρ}	95% Credibility Interval
H1: There is a positive and significant relationship between the Individual Impact and the ERP success	**10**	**1559**	**1129,049**	**0,724**	**8,204**	**0,005**	**0,073**	**0,001**	**0,038**	**0,65 - 0,79**	**0,004**	**0,062**	**0,808**	**0,908**	**0,845**	**0,002**	**0,044**	**0,76 - 0,93**
H2: There is a positive and significant relationship between the Information/ Data Quality and the ERP success	**13**	**1940**	**1307,849**	**0,674**	**20,792**	**0,011**	**0,104**	**0,002**	**0,045**	**0,58 - 0,76**	**0,009**	**0,093**	**0,832**	**0,908**	**0,775**	**0,003**	**0,051**	**0,67 - 0,87**
H3: There is a positive and significant relationship between the Work Group Impact and the ERP success	**4**	**389**	**260,691**	**0,670**	**0,253**	**0,001**	**0,026**	**0,003**	**0,056**	**0,56 - 0,78**	**0,002**	**0,050**	**0,843**	**0,908**	**0,766**	**0,004**	**0,064**	**0,64 - 0,89**
H4: There is a positive and significant relationship between the Organizational impact and the ERP success	**13**	**1611**	**888,202**	**0,551**	**224,064**	**0,139**	**0,373**	**0,004**	**0,063**	**0,43 - 0,67**	**0,135**	**0,368**	**0,829**	**0,908**	**0,635**	**0,005**	**0,072**	**0,49 - 0,77**
H5: There is a positive and significant relationship between the Top Management Support and the ERP success	**10**	**1455**	**747,688**	**0,514**	**30,887**	**0,021**	**0,146**	**0,004**	**0,061**	**0,39 - 0,63**	**0,018**	**0,132**	**0,870**	**0,908**	**0,578**	**0,005**	**0,069**	**0,44 - 0,71**
H6: There is a positive and significant relationship between the Vendor and Consulting Quality and the ERP success	**14**	**2007**	**870,371**	**0,434**	**153,244**	**0,076**	**0,276**	**0,005**	**0,068**	**0,30 - 0,56**	**0,072**	**0,268**	**0,848**	**0,908**	**0,494**	**0,006**	**0,077**	**0,34 - 0,64**

Table 5 cont.

H7: There is a positive and significant relationship between the System Quality and the ERP success	**19**	**3545**	**1512,631**	**0,635**	**50,434**	**0,014**	**0,119**	**0,002**	**0,044**	**0,55 - 0,72**	**0,012**	**0,111**	**0,847**	**0,908**	**0,724**	**0,002**	**0,050**	**0,62 - 0,82**
H8: There is a positive and significant relationship between the Training and Education and the ERP success	**6**	**960**	**386,262**	**0,402**	**13,996**	**0,015**	**0,121**	**0,004**	**0,066**	**0,27 - 0,53**	**0,010**	**0,101**	**0,842**	**0,908**	**0,460**	**0,006**	**0,076**	**0,31 - 0,61**
H9: There is a positive and significant relationship between the Business Process Reengineering and the ERP success	**13**	**1560**	**483,598**	**0,310**	**191,718**	**0,123**	**0,351**	**0,007**	**0,083**	**0,14 - 0,47**	**0,116**	**0,341**	**0,848**	**0,908**	**0,353**	**0,009**	**0,094**	**0,17 - 0,53**
H10: There is a positive and significant relationship between the Project Management and the ERP success	**8**	**932**	**275,668**	**0,296**	**11,159**	**0,012**	**0,109**	**0,007**	**0,085**	**0,13 - 0,46**	**0,005**	**0,069**	**0,915**	**0,908**	**0,324**	**0,009**	**0,093**	**0,14 - 0,50**
H11: There is a positive and significant relationship between the ERP Fit/Integration and the ERP success	**11**	**1594**	**395,564**	**0,265**	**98,717**	**0,066**	**0,257**	**0,006**	**0,080**	**0,10 - 0,42**	**0,060**	**0,244**	**0,829**	**0,908**	**0,305**	**0,008**	**0,092**	**0,12 - 0,48**

K= Number of studies included; $\sum N_i = total\ sample\ size$; $\bar{r}$= correlation corrected for sampling error; ρ = correlation corrected for both sampling error and error of measurement

Publication Bias and Heterogeneity

Failsafe N and the Funnel Plots

To investigate the publication bias, and heterogeneity, we used the funnel plots and failsafe N (See Appendix). The funnel plots are defined by Wu and Lederer (2009) as a simple scatterplots of the Fisher's Z (horizontal axis) against the standard error (vertical axis). In the absence of bias, the funnel plot shows a symmetric inverted funnel shape with effect sizes and the inverse of the standard deviation. The publication bias may not be only identified by the funnel plots, other tests must be taken into account such as failsafe N, that represents the number of additional studies (with null results) needed to render the results for that relationship non-significant at a pre-specified level ($p \leq 0.05$) (Wu & Lederer, 2009). Both tests were computed for each factor to determine the publications bias. The Failsafe N shows the robustness of our results, it varies from 186 to 9509 with an average of 2112. They provide a confidence in the robustness of our meta-analysis (For example, we need 9509 additional studies with non-significant results to make the positive correlation between the system quality and the ERP success non-significant). In this study both funnel plots test and failsafe N show that the publication bias is not a problem.

Heterogeneity Test

The heterogeneity or homogeneity test (Hedges, 1982; Rosenthal, 1995) could be used as a tool in deciding whether observed effect sizes are more variable than would be expected from sampling error alone (Wu & Lederer, 2009). If there is a strong heterogeneity we have to search the moderator variables that could be considered as an explanation of the effect sizes variation. In our case we identified five main variables that could be considered as moderators: the geographic area and culture, the nature of the sector, the type of ERP software, the implementation phase, and the respondent function.

$I^2 = \frac{Q-(K-1)}{Q}$ (Table 4), this index describes the percentage of variation across study that is due to heterogeneity rather than the chance, on the other hand it measures the variation that is not due to chance, it can take values from 0% to 100%.

The Fisher's Z is computed by normalizing the correlation coefficients using the following formula: Fisher's $z = 0.5 \times \ln \frac{1+r}{1-r}$; then to calculate the weighted average z: $\bar{z} = \frac{\sum n_i z_i}{\sum n_i}$; where n_i is the sample size in study *i*. Finally, the Q statistic is computed by using the following formula: $Q = \sum(n_I - 3)(z_i - \bar{z})^2$ (Hedges, 1982; Rosenthal, 1995; Wu & Lederer, 2009).

DISCUSSION, IMPLICATIONS, AND CONCLUSION

Research Implications

This study provides both theoretical backgrounds and empirical contribution to understand the factors that impact the ERP project success, this impact was measured in three levels of performance, individual, group, and organization. Thus, this study proposes a new taxonomy of the critical success factors and explains the ERP system success process using a strong theoretical foundations, mathematical theory of communication, diffusion innovation theory and AST (Adaptive Structuration Theory). The theoretical model developed in this work explains the ERP system success from two main dimensions, a causal dimension and a process dimension. The first one highlights the variables that contribute on the ERP system adoption and use, based on diffusions of innovations theory (Rogers, 1984). The second sheds the light on the process of the ERP system success through the explanation of interaction between organizational, individual, and technological variables based on the one hand on the mathematical theory of communication to explain how the system quality output impacts the individual and organizational performance (Weaver & Shannon, 1949; Mason, 1978), and on the other hand on the AST (DeSanctis & Poole, 1994) to explain the interaction between the human actors (ERP Users) and the technology, and how this later leads to improve the efficiency, quality and performance. The theoretical model developed in this study is appropriated to the ERP system; it takes into account the features of both implementation and use of the ERP system. Because, the ERP system is considered as a project including different stakeholders, organization involvement, user involvement,

vendor and consultant involvement, its success depends on the collaboration between all the organization partners. Thus, the model explains how the organizational, technological, and environmental critical factors contribute to the ERP system adoption and use, which is considered as a synonymous of the ERP system quality. Then, the model shows the quality output represented by data and information quality, and how this later affects the performance and the efficiency. The definition of the success adopted in this model reveals that the success is considered as a correspondence and an interaction (Lyytinen & Hirscheim, 1987). The correspondence highlights the fit between the ERP system and the organization objectives that leads to improve the organizational performance. The interaction success represents the positive user attitudes toward the ERP system, which contribute to improve both individual and workgroup performance.

Managerial Implications

This research work provides a new tool to practitioners enabling them a better understanding of the ERP system success project. Information system managers, top management, and ERP users need to understand the implication of their actions in the success process and how they contribute in the performance improvement. Thus, this work seeks to highlight the vendor and consultants contributions to perform the ERP project. To face more than three quarters of unsuccessful ERP project, organizations need to be able to evaluate the contribution of each CSF in the ERP life cycle. This need leads us to investigate this question by developing a new model that explain the relationships between the ERP partners on the one hand and propose the main factors to succeed the ERP project on the other. Eleven significant CSF were identified in this study and classified by the magnitude of effect sizes (Lipsey & Wilson, 2004) given by every one based on a robustness methodology tests. This study offers a practical understanding for organization to determining the CFS's of complex information system such as the ERP system.

While we classify the effect sizes of the eleven CSF's by the strength of relationships using three main categories of taxonomy, strong, moderate, and weak. This taxonomy by the relationship importance between the constructs gives a clear vision to IS managers.

Conclusion, Limitation, and Perspectives

The meta-analysis methodology is a recent tool considered as a subject of many critics (Laroche & Soulez, 2012). This methodology has shown its robustness in some fields like psychology and medicine. However, in management science there are a few numbers of researchers that use this methodology despite its importance and the reliability of its results, but this methodology requires a good knowledge of statistical tools and a detailed explanation of each step in the process of collecting, selecting, and coding studies.

We stress that this work is considered as the first one that tries to meta-analyze quantitatively the CSF's of ERP Success and attempts to summarize all the existing empirical researches in one study using a meta-analysis methodology. We have empirically validated our theoretical model that we proposed; and we found that our entire hypotheses were supported. Factors that we identified contribute to the ERP success. However, this contribution changes from one factor to another, but all the relationships are significant between the factors that we selected and the ERP Success. The Critical Factors of ERP system success in both pre-implementation and post-implementation phases are significant. However, some factors were found more significant than others, the factors with a high significant magnitude explain a very important role in the ERP system success and they need an important investment by organization to improve their benefits from the ERP System implementation.

This work provides important findings regarding the ERP system success; it also proposes and explains the contribution of the CSF's in the performance improvement. However, there are some limitations of this study that should be emphasized:

Firstly, the methodology used in our study: The meta-analysis methodology as a new technique using only a quantitative resultants stays a subject of many critics in information system field. It can only be performed on research that performs quantitative analysis; qualitative or conceptual works must be excluded (Petter & McLean, 2009). Additionally, the number of studies found and used in this work is not to large, it could be considered as a limit of work results.

Secondly, the performance measurement levels used in this study. Previous research using a meta-analysis methodology, delineate their level of analysis to only one level of measurement, for example organizational level of performance (Kirca et al., 2005; Petter & McLean, 2009). In this study we use three levels of performance measurement: individual, group, and organizational performance.

Thirdly, the moderator factors (contingency factors) are not included in our meta-analysis with a quantitative analysis (subgroup analysis or bootstrap technics) to better understand some sources of heterogeneity. This last point should be considered as a main idea for future research to provide a new understanding of the role of the contingency factors in the ERP system Success.

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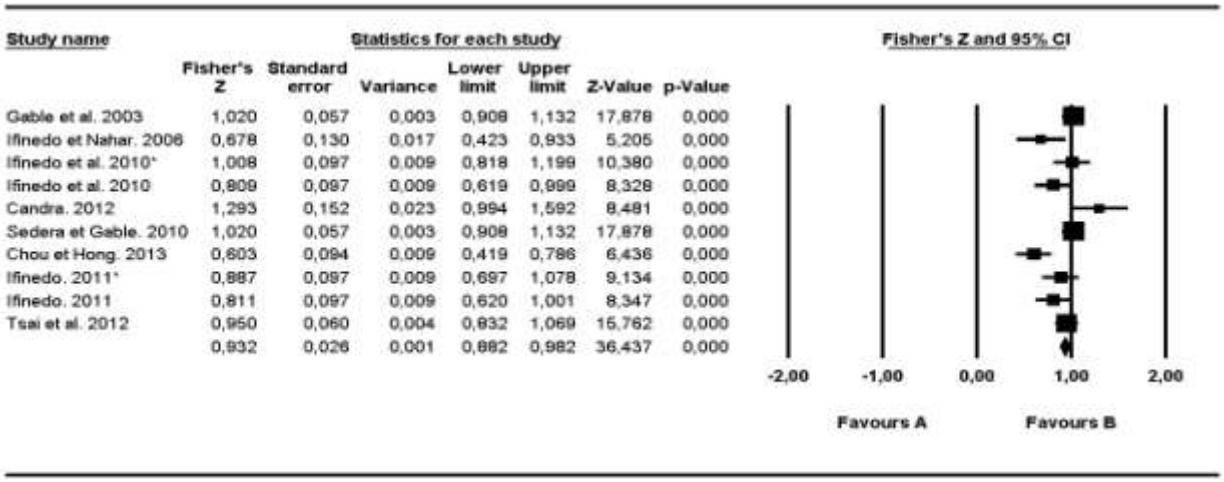
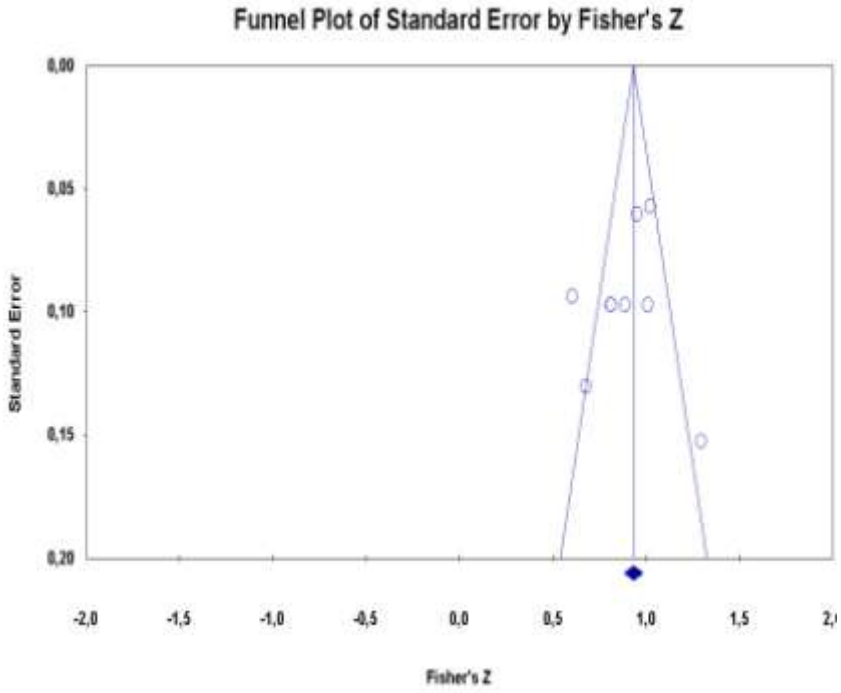
APPENDIX

Individual Impact



Model	Study name	Statistics for each study							Sample size	Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Total	Relative weight	Relative weight
	Gable et al. 2003	1,020	0,057	0,003	0,908	1,132	17,878	0,000	310	20,08	12,66
	Ifinedo et Nahar. 2006	0,678	0,130	0,017	0,423	0,933	5,205	0,000	62	3,86	7,48
	Ifinedo et al. 2010*	1,008	0,097	0,009	0,818	1,199	10,380	0,000	109	6,93	9,65
	Ifinedo et al. 2010	0,809	0,097	0,009	0,619	0,999	8,328	0,000	109	6,93	9,65
	Candra. 2012	1,293	0,152	0,023	0,994	1,592	8,481	0,000	46	2,81	6,29
	Sedera et Gable. 2010	1,020	0,057	0,003	0,908	1,132	17,878	0,000	310	20,08	12,66
	Chou et Hong. 2013	0,603	0,094	0,009	0,419	0,786	6,436	0,000	117	7,46	9,90
	Ifinedo. 2011*	0,887	0,097	0,009	0,697	1,078	9,134	0,000	109	6,93	9,65
	Ifinedo. 2011	0,811	0,097	0,009	0,620	1,001	8,347	0,000	109	6,93	9,65
	Tsai et al. 2012	0,950	0,060	0,004	0,832	1,069	15,762	0,000	278	17,99	12,43
Fixed		0,932	0,026	0,001	0,882	0,982	36,437	0,000			
Random		0,907	0,050	0,002	0,809	1,005	18,148	0,000			



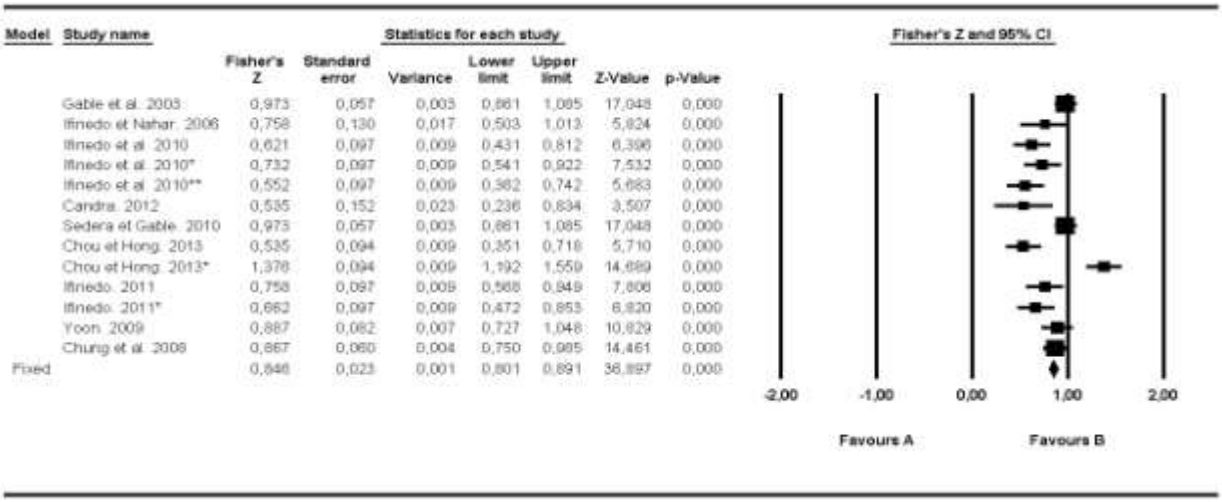
Classic fail-safe N

Z-value for observed studies	34,09829
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	10,00000
Number of missing studies that would bring p-value to > alpha	3017,00000

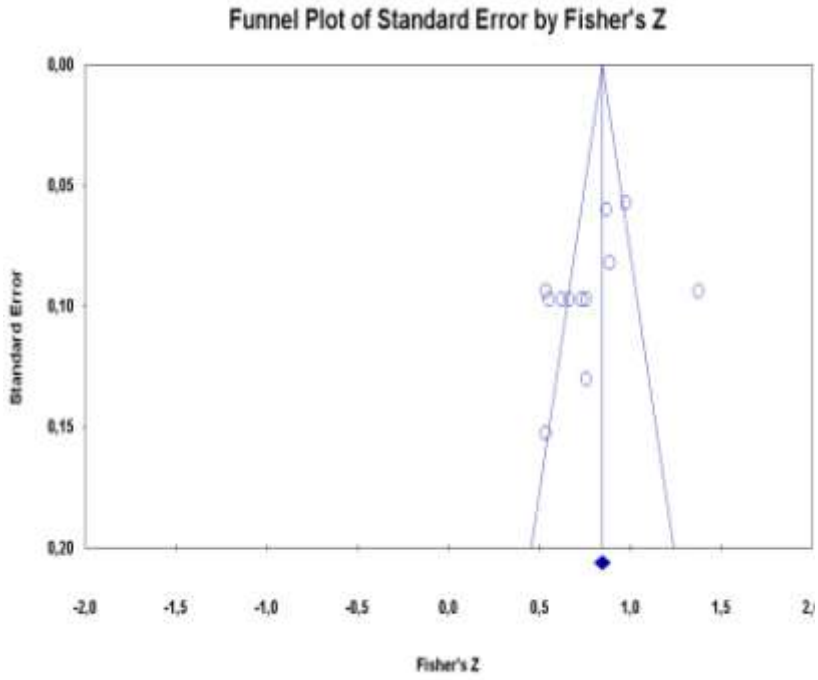
Orwin's fail-safe N

Fisher's Z in observed studies	0,93183
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Information Quality



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Gable et al. 2003	0,973	0,057	0,003	0,861	1,085	17,048	0,000	16,15	8,71
	Ifinedo et Nahar. 2006	0,758	0,130	0,017	0,503	1,013	5,824	0,000	3,10	6,58
	Ifinedo et al. 2010	0,621	0,097	0,009	0,431	0,812	6,396	0,000	5,58	7,60
	Ifinedo et al. 2010*	0,732	0,097	0,009	0,541	0,922	7,532	0,000	5,58	7,60
	Ifinedo et al. 2010**	0,552	0,097	0,009	0,362	0,742	5,683	0,000	5,58	7,60
	Candra. 2012	0,535	0,152	0,023	0,236	0,834	3,507	0,000	2,26	5,91
	Sedera et Gable. 2010	0,973	0,057	0,003	0,861	1,085	17,048	0,000	16,15	8,71
	Chou et Hong. 2013	0,535	0,094	0,009	0,351	0,718	5,710	0,000	6,00	7,70
	Chou et Hong. 2013*	1,376	0,094	0,009	1,192	1,559	14,689	0,000	6,00	7,70
	Ifinedo. 2011	0,758	0,097	0,009	0,568	0,949	7,806	0,000	5,58	7,60
	Ifinedo. 2011*	0,662	0,097	0,009	0,472	0,853	6,820	0,000	5,58	7,60
	Yoon. 2009	0,887	0,082	0,007	0,727	1,048	10,829	0,000	7,84	8,05
	Chung et al. 2008	0,867	0,060	0,004	0,750	0,985	14,461	0,000	14,62	8,64
Fixed		0,846	0,023	0,001	0,801	0,891	36,897	0,000		
Random		0,797	0,061	0,004	0,678	0,916	13,158	0,000		



Classic fail-safe N

Z-value for observed studies	34,21149
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	13,00000
Number of missing studies that would bring p-value to > alpha	3948,00000

Orwin's fail-safe N

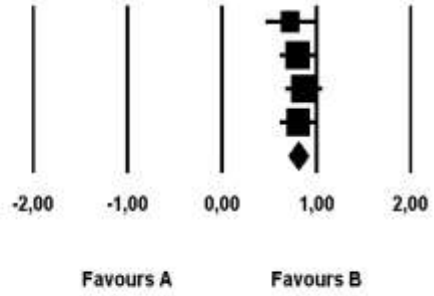
Fisher's Z in observed studies	0,84624
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Workgroup Impact

Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Ifinedo et Nahar. 2006	0,725	0,130	0,017	0,470	0,980	5,569	0,000
Ifinedo et al. 2010*	0,809	0,097	0,009	0,619	0,999	8,328	0,000
Ifinedo et al. 2010	0,867	0,097	0,009	0,677	1,058	8,929	0,000
Ifinedo. 2011	0,811	0,097	0,009	0,620	1,001	8,347	0,000
	0,813	0,052	0,003	0,712	0,914	15,780	0,000

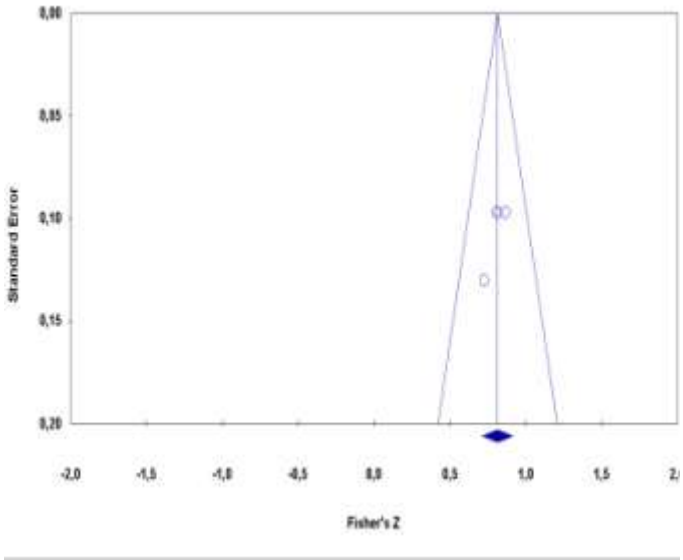
Statistics for each study

Fisher's Z and 95% CI



Model	Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Weight (Fixed) Relative weight	Weight (Random) Relative weight
	Ifinedo et Nahar. 2006	0,725	0,130	0,017	0,470	0,980	5,569	0,000	15,65	15,65
	Ifinedo et al. 2010*	0,809	0,097	0,009	0,619	0,999	8,328	0,000	28,12	28,12
	Ifinedo et al. 2010	0,867	0,097	0,009	0,677	1,058	8,929	0,000	28,12	28,12
	Ifinedo. 2011	0,811	0,097	0,009	0,620	1,001	8,347	0,000	28,12	28,12
Fixed		0,813	0,052	0,003	0,712	0,914	15,780	0,000		
Random		0,813	0,052	0,003	0,712	0,914	15,780	0,000		

Funnel Plot of Standard Error by Fisher's Z



Classic fail-safe N

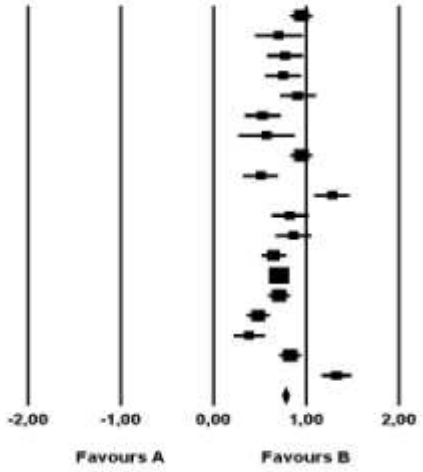
Z-value for observed studies	15,58692
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	4,00000
Number of missing studies that would bring p-value to > alpha	249,00000

Orwin's fail-safe N

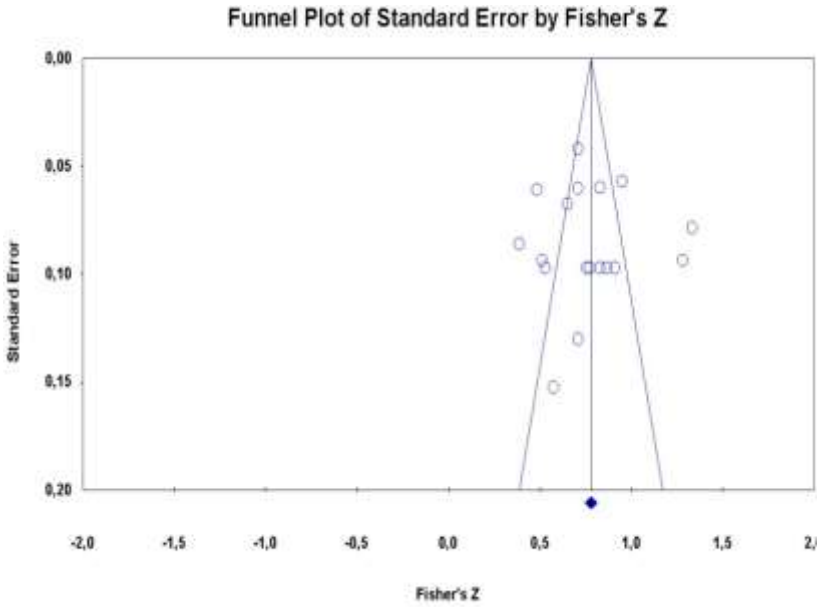
Fisher's Z in observed studies	0,81272
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

System Quality

Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Gable et al. 2003	0,950	0,057	0,003	0,839	1,062	16,654	0,000
Ifinedo et Nahar. 2006	0,709	0,130	0,017	0,454	0,964	5,445	0,000
Ifinedo et al. 2010	0,774	0,097	0,009	0,583	0,964	7,964	0,000
Ifinedo et al. 2010*	0,756	0,097	0,009	0,566	0,947	7,788	0,000
Ifinedo et al. 2010**	0,910	0,097	0,009	0,719	1,100	9,366	0,000
Ifinedo et al. 2010***	0,530	0,097	0,009	0,339	0,720	5,452	0,000
Candra. 2012	0,575	0,152	0,023	0,276	0,874	3,770	0,000
Sedera et Gable. 2010	0,950	0,057	0,003	0,839	1,062	16,654	0,000
Chou et Hong. 2013	0,513	0,094	0,009	0,329	0,696	5,474	0,000
Chou et Hong. 2013*	1,282	0,094	0,009	1,098	1,466	13,687	0,000
Ifinedo. 2011	0,829	0,097	0,009	0,639	1,019	8,536	0,000
Ifinedo. 2011*	0,867	0,097	0,009	0,677	1,058	8,929	0,000
Choi et al. 2007	0,652	0,067	0,005	0,520	0,784	9,670	0,000
Amoako-Gyampah. 2007	0,709	0,042	0,002	0,627	0,791	16,896	0,000
Tsai et al. 2012	0,709	0,060	0,004	0,591	0,827	11,756	0,000
Kwahk et Lee. 2008	0,485	0,061	0,004	0,365	0,604	7,964	0,000
Sun et al. 2009	0,388	0,086	0,007	0,220	0,557	4,513	0,000
Chung et al. 2008	0,829	0,060	0,004	0,712	0,947	13,824	0,000
Shih et Huang. 2009	1,333	0,079	0,006	1,179	1,487	16,967	0,000
	0,780	0,017	0,000	0,747	0,813	46,057	0,000



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Gable et al. 2003	0.950	0.057	0.003	0.839	1.062	16.654	0.000	8.80	5.72
	Ifinedo et Nahar. 2006	0.709	0.130	0.017	0.454	0.964	5.445	0.000	1.69	4.49
	Ifinedo et al. 2010	0.774	0.097	0.009	0.583	0.964	7.964	0.000	3.04	5.09
	Ifinedo et al. 2010*	0.756	0.097	0.009	0.566	0.947	7.788	0.000	3.04	5.09
	Ifinedo et al. 2010**	0.910	0.097	0.009	0.719	1.100	9.366	0.000	3.04	5.09
	Ifinedo et al. 2010***	0.530	0.097	0.009	0.339	0.720	5.452	0.000	3.04	5.09
	Candra. 2012	0.575	0.152	0.023	0.276	0.874	3.770	0.000	1.23	4.08
	Sedera et Gable. 2010	0.950	0.057	0.003	0.839	1.062	16.654	0.000	8.80	5.72
	Chou et Hong. 2013	0.513	0.094	0.009	0.329	0.696	5.474	0.000	3.27	5.15
	Chou et Hong. 2013*	1.282	0.094	0.009	1.098	1.466	13.687	0.000	3.27	5.15
	Ifinedo. 2011	0.829	0.097	0.009	0.639	1.019	8.536	0.000	3.04	5.09
	Ifinedo. 2011*	0.867	0.097	0.009	0.677	1.058	8.929	0.000	3.04	5.09
	Choi et al. 2007	0.652	0.067	0.005	0.520	0.784	9.670	0.000	6.31	5.57
	Amoako-Gyampah. 2007	0.709	0.042	0.002	0.627	0.791	16.896	0.000	16.28	5.89
	Tsai et al. 2012	0.709	0.060	0.004	0.591	0.827	11.756	0.000	7.88	5.67
	Kwahk et Lee. 2008	0.485	0.061	0.004	0.365	0.604	7.964	0.000	7.74	5.67
	Sun et al. 2009	0.388	0.086	0.007	0.220	0.557	4.513	0.000	3.87	5.28
	Chung et al. 2008	0.829	0.060	0.004	0.712	0.947	13.824	0.000	7.97	5.68
	Shih et Huang. 2009	1.333	0.079	0.006	1.179	1.487	16.967	0.000	4.64	5.40
Fixed		0.780	0.017	0.000	0.747	0.813	46.057	0.000		
Random		0.779	0.053	0.003	0.674	0.884	14.569	0.000		



Classic fail-safe N

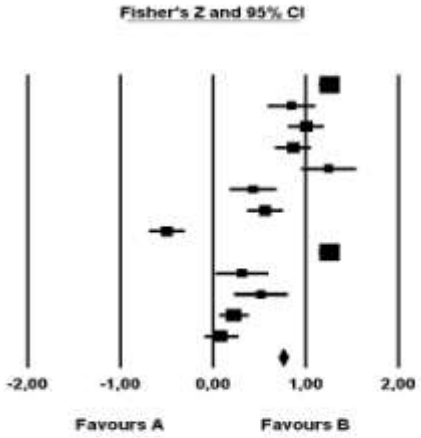
Z-value for observed studies	43,88981
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	19,00000
Number of missing studies that would bring p-value to > alpha	9509,00000

Orwin's fail-safe N

Fisher's Z in observed studies	0,77985
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

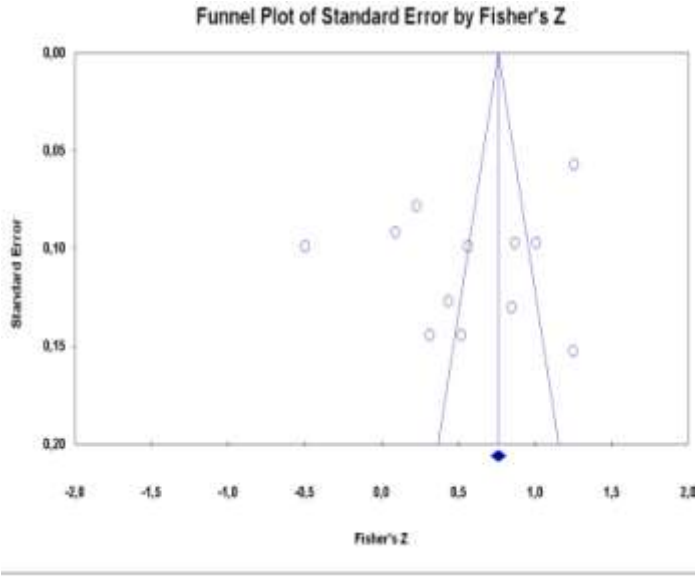
Organizational Impact

Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Gable et al. 2003	1,256	0,057	0,003	1,144	1,368	22,010	0,000
Ifinedo et Nahar. 2006	0,848	0,130	0,017	0,593	1,103	6,513	0,000
Ifinedo et al. 2010*	1,008	0,097	0,009	0,818	1,199	10,380	0,000
Ifinedo et al. 2010	0,867	0,097	0,009	0,677	1,058	8,929	0,000
Candra. 2012	1,249	0,152	0,023	0,950	1,548	8,190	0,000
Zhu et al. 2010	0,436	0,127	0,016	0,187	0,685	3,430	0,001
Hong et Kim. 2002*	0,563	0,099	0,010	0,369	0,757	5,683	0,000
Hong et Kim. 2002	-0,497	0,099	0,010	-0,691	-0,303	-5,023	0,000
Sedera et Gable. 2010	1,256	0,057	0,003	1,144	1,368	22,010	0,000
Bradford et Florin. 2003*	0,314	0,144	0,021	0,031	0,597	2,175	0,030
Bradford et Florin. 2003	0,519	0,144	0,021	0,236	0,802	3,596	0,000
Chou et Chang. 2008	0,227	0,078	0,006	0,073	0,380	2,896	0,004
Grant et al. 2013	0,090	0,092	0,008	-0,089	0,270	0,984	0,325
	0,760	0,025	0,001	0,711	0,810	30,145	0,000



Meta Analysis

Model	Study name	Statistics for each study: Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Weight (Fixed): Relative weight	Weight (Random): Relative weight
	Gable et al. 2003	1,256	0,057	0,003	1,144	1,368	22,010	0,000	19,53	7,90
	Ifinedo et Nahar. 2006	0,848	0,130	0,017	0,593	1,103	6,513	0,000	3,75	7,58
	Ifinedo et al. 2010*	1,008	0,097	0,009	0,818	1,199	10,380	0,000	6,74	7,75
	Ifinedo et al. 2010	0,867	0,097	0,009	0,677	1,058	8,929	0,000	6,74	7,75
	Candra. 2012	1,249	0,152	0,023	0,950	1,548	8,190	0,000	2,74	7,44
	Zhu et al. 2010	0,436	0,127	0,016	0,187	0,685	3,430	0,001	3,94	7,60
	Hong et Kim. 2002*	0,563	0,099	0,010	0,369	0,757	5,683	0,000	6,49	7,74
	Hong et Kim. 2002	-0,497	0,099	0,010	-0,691	-0,303	-5,023	0,000	6,49	7,74
	Sedera et Gable. 2010	1,256	0,057	0,003	1,144	1,368	22,010	0,000	19,53	7,90
	Bradford et Florin. 2003*	0,314	0,144	0,021	0,031	0,597	2,175	0,030	3,05	7,49
	Bradford et Florin. 2003	0,519	0,144	0,021	0,236	0,802	3,596	0,000	3,05	7,49
	Chou et Chang. 2008	0,227	0,078	0,006	0,073	0,380	2,896	0,004	10,37	7,83
	Grant et al. 2013	0,090	0,092	0,008	-0,089	0,270	0,984	0,325	7,57	7,78
Fixed		0,760	0,025	0,001	0,711	0,810	30,145	0,000		
Random		0,626	0,159	0,025	0,314	0,938	3,934	0,000		



Classic fail-safe N

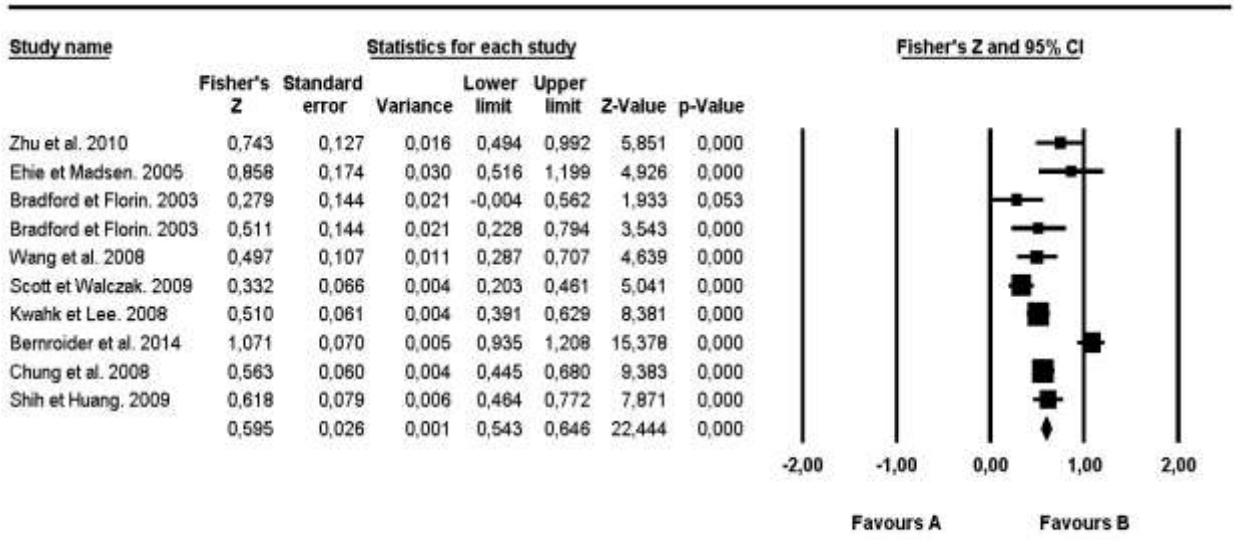
Z-value for observed studies	25,45348
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	13,00000
Number of missing studies that would bring p-value to > alpha	2180,00000

Orwin's fail-safe N

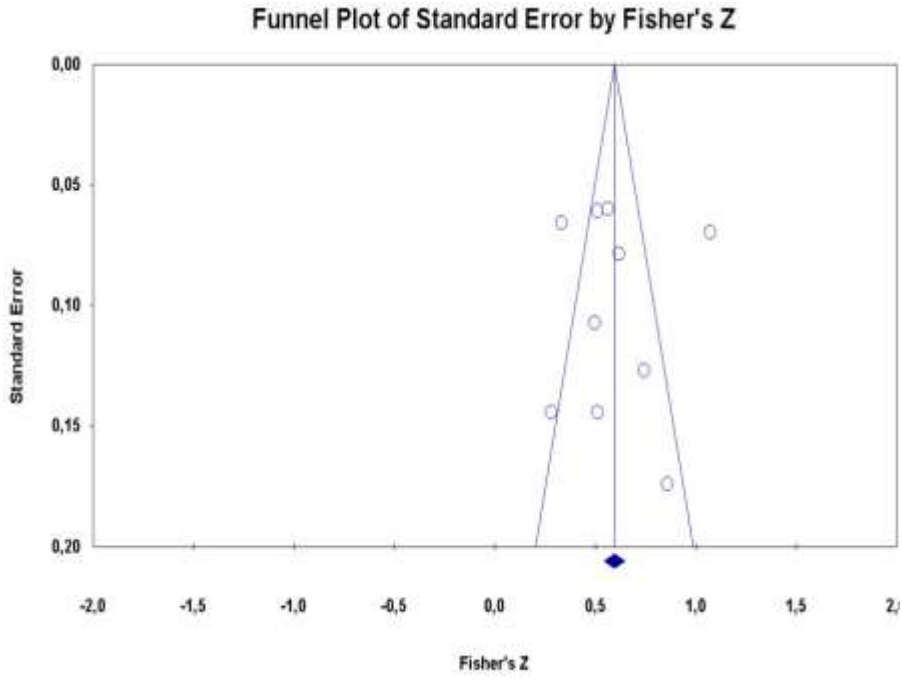
Fisher's Z in observed studies	0,76030
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Criterion must fall between other values

Top Management Support



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Zhu et al. 2010	0,743	0,127	0,016	0,494	0,992	5,851	0,000	4,35	9,28
	Ehie et Madsen. 2005	0,858	0,174	0,030	0,516	1,199	4,926	0,000	2,32	7,72
	Bradford et Florin. 2003	0,279	0,144	0,021	-0,004	0,562	1,933	0,053	3,37	8,70
	Bradford et Florin. 2003	0,511	0,144	0,021	0,228	0,794	3,543	0,000	3,37	8,70
	Wang et al. 2008	0,497	0,107	0,011	0,287	0,707	4,639	0,000	6,11	9,94
	Scott et Walczak. 2009	0,332	0,066	0,004	0,203	0,461	5,041	0,000	16,21	11,17
	Kwahk et Lee. 2008	0,510	0,061	0,004	0,391	0,629	8,381	0,000	18,95	11,29
	Bernroider et al. 2014	1,071	0,070	0,005	0,935	1,208	15,378	0,000	14,46	11,07
	Chung et al. 2008	0,563	0,060	0,004	0,445	0,680	9,383	0,000	19,51	11,31
	Shih et Huang. 2009	0,618	0,079	0,006	0,464	0,772	7,871	0,000	11,37	10,82
Fixed		0,595	0,026	0,001	0,543	0,646	22,444	0,000		
Random		0,597	0,081	0,006	0,439	0,755	7,414	0,000		



Classic fail-safe N

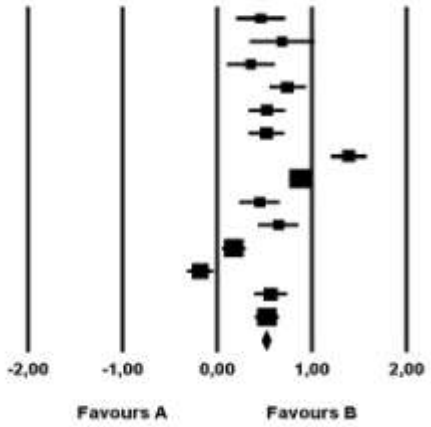
Z-value for observed studies	21,16985
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	10,00000
Number of missing studies that would bring p-value to > alpha	1157,00000

Orwin's fail-safe N

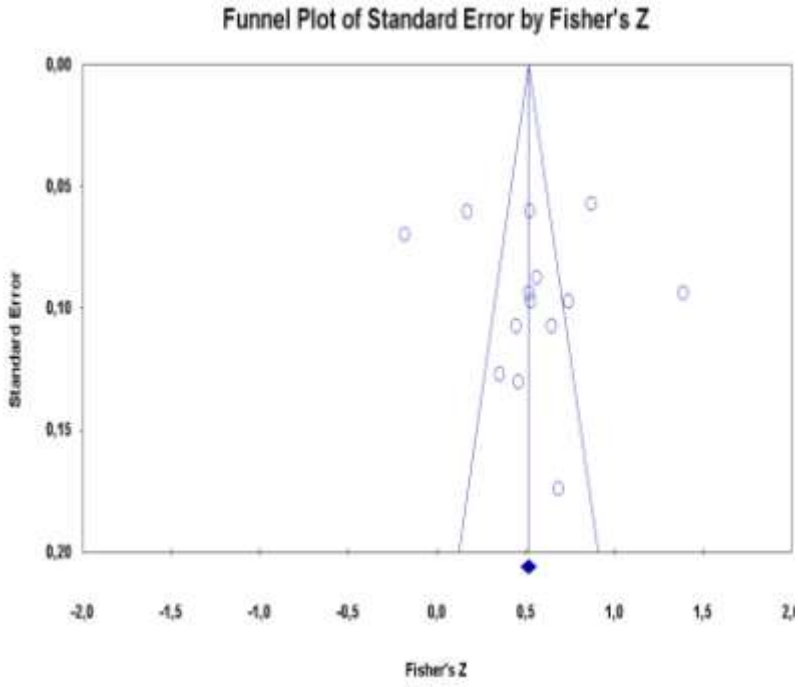
Fisher's Z in observed studies	0,59455
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Vendor Consultant Quality

Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Ifinedo et Nahar. 2006	0,460	0,130	0,017	0,205	0,715	3,533	0,000
Ehie et Madsen. 2005	0,685	0,174	0,030	0,344	1,027	3,937	0,000
Zhu et al. 2010	0,355	0,127	0,016	0,106	0,604	2,797	0,005
Ifinedo et al. 2010*	0,741	0,097	0,009	0,551	0,932	7,633	0,000
Ifinedo et al. 2010	0,528	0,097	0,009	0,338	0,719	5,438	0,000
Chou et Hong. 2013*	0,519	0,094	0,009	0,336	0,703	5,542	0,000
Chou et Hong. 2013	1,389	0,094	0,009	1,206	1,573	14,833	0,000
Sedera et Gable. 2010	0,871	0,057	0,003	0,759	0,983	15,265	0,000
Wang et al. 2008*	0,448	0,107	0,011	0,238	0,658	4,176	0,000
Wang et al. 2008	0,648	0,107	0,011	0,437	0,858	6,040	0,000
Tsai et al. 2012	0,172	0,060	0,004	0,053	0,290	2,847	0,004
Bernroider et al. 2014	-0,182	0,070	0,005	-0,319	-0,045	-2,612	0,009
Lapiedra et al. 2011	0,563	0,087	0,008	0,391	0,734	6,441	0,000
Chung et al. 2008	0,523	0,060	0,004	0,405	0,641	8,720	0,000
	0,517	0,023	0,001	0,473	0,561	22,908	0,000



Model	Study name	Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Weight (Fixed) Relative weight	Weight (Random) Relative weight
	Ifinedo et Nahar. 2006	0,460	0,130	0,017	0,205	0,715	3,533	0,000	3,00	6,84
	Ehie et Madsen. 2005	0,685	0,174	0,030	0,344	1,027	3,937	0,000	1,68	6,32
	Zhu et al. 2010	0,355	0,127	0,016	0,106	0,604	2,797	0,005	3,16	6,88
	Ifinedo et al. 2010*	0,741	0,097	0,009	0,551	0,932	7,633	0,000	5,39	7,17
	Ifinedo et al. 2010	0,528	0,097	0,009	0,338	0,719	5,438	0,000	5,39	7,17
	Chou et Hong. 2013*	0,519	0,094	0,009	0,336	0,703	5,542	0,000	5,80	7,21
	Chou et Hong. 2013	1,389	0,094	0,009	1,206	1,573	14,833	0,000	5,80	7,21
	Sedera et Gable. 2010	0,871	0,057	0,003	0,759	0,983	15,265	0,000	15,62	7,47
	Wang et al. 2008*	0,448	0,107	0,011	0,238	0,658	4,176	0,000	4,43	7,08
	Wang et al. 2008	0,648	0,107	0,011	0,437	0,858	6,040	0,000	4,43	7,08
	Tsai et al. 2012	0,172	0,060	0,004	0,053	0,290	2,847	0,004	13,99	7,46
	Bernroider et al. 2014	-0,182	0,070	0,005	-0,319	-0,045	-2,612	0,009	10,48	7,40
	Lapiedra et al. 2011	0,563	0,087	0,008	0,391	0,734	6,441	0,000	6,67	7,26
	Chung et al. 2008	0,523	0,060	0,004	0,405	0,641	8,720	0,000	14,15	7,46
Fixed		0,517	0,023	0,001	0,473	0,561	22,908	0,000		
Random		0,550	0,105	0,011	0,344	0,756	5,231	0,000		



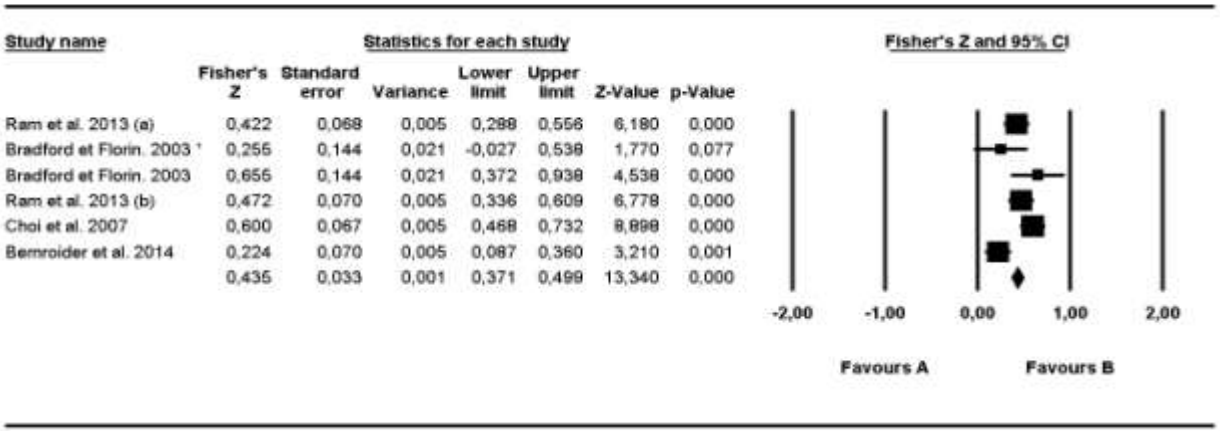
Classic fail-safe N

Z-value for observed studies	22,60752
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	14,00000
Number of missing studies that would bring p-value to > alpha	1849,00000

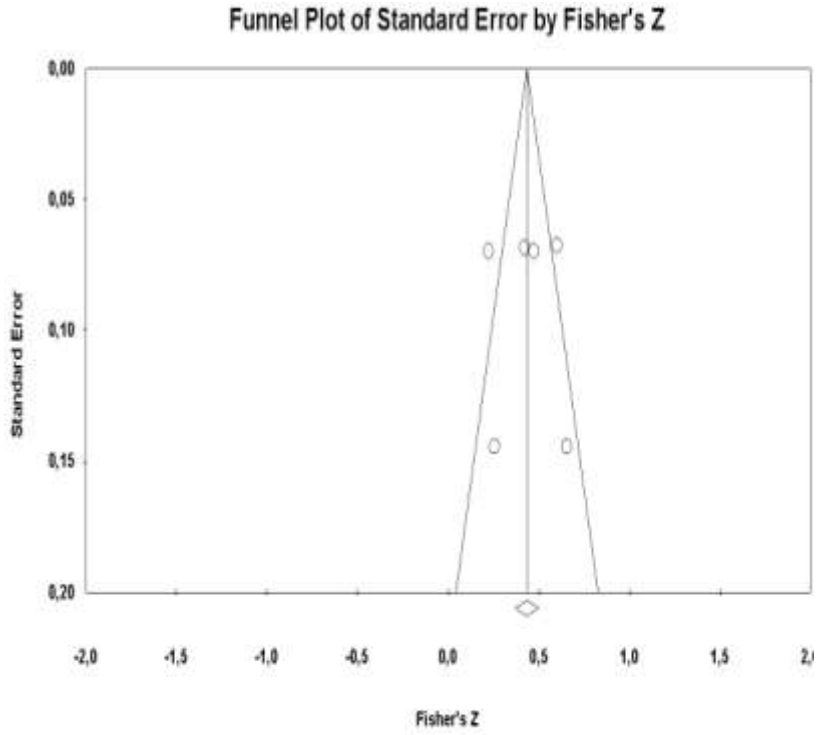
Orwin's fail-safe N

Fisher's Z in observed studies	0,51678
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Training and Education



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Ram et al. 2013 (a)	0,422	0,068	0,005	0,288	0,556	6,180	0,000	22,72	19,29
	Bradford et Florin. 2003 *	0,255	0,144	0,021	-0,027	0,538	1,770	0,077	5,10	11,51
	Bradford et Florin. 2003	0,655	0,144	0,021	0,372	0,938	4,538	0,000	5,10	11,51
	Ram et al. 2013 (b)	0,472	0,070	0,005	0,336	0,609	6,778	0,000	21,87	19,15
	Choi et al. 2007	0,600	0,067	0,005	0,468	0,732	8,898	0,000	23,35	19,39
	Bemroider et al. 2014	0,224	0,070	0,005	0,087	0,360	3,210	0,001	21,87	19,15
Fixed		0,435	0,033	0,001	0,371	0,499	13,340	0,000		
Random		0,436	0,068	0,005	0,303	0,569	6,417	0,000		



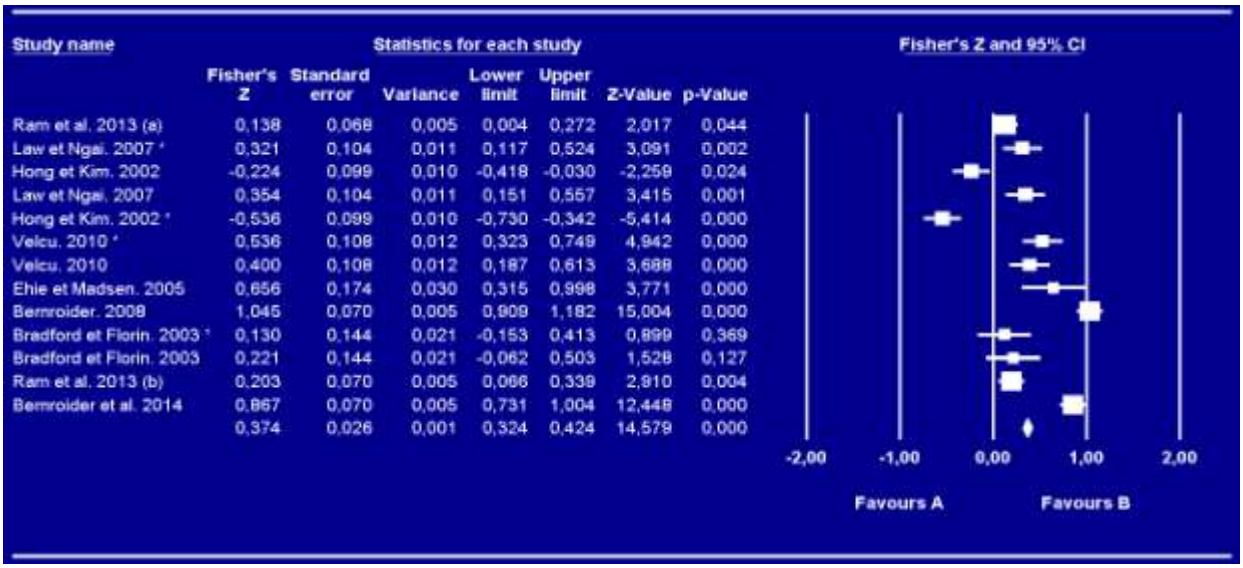
Classic fail-safe N

Z-value for observed studies	12,80820
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	6,00000
Number of missing studies that would bring p-value to > alpha	251,00000

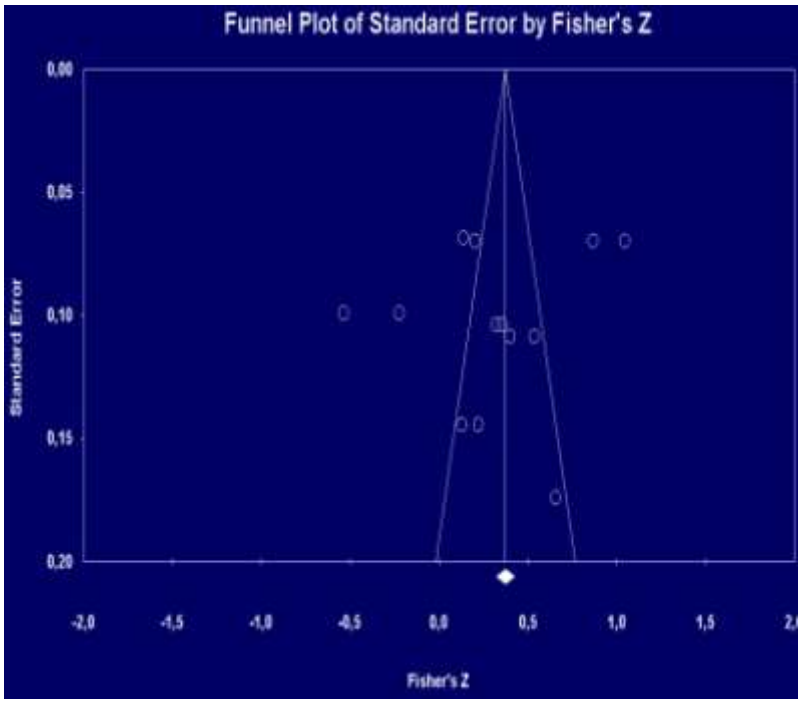
Orwin's fail-safe N

Fisher's Z in observed studies	0,43465
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Business Process Reengineering



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Ram et al. 2013 (a)	0,138	0,068	0,005	0,004	0,272	2,017	0,044	14,07	7,95
	Law et Ngai. 2007 *	0,321	0,104	0,011	0,117	0,524	3,091	0,002	6,11	7,73
	Hong et Kim. 2002	-0,224	0,099	0,010	-0,418	-0,030	-2,259	0,024	6,71	7,76
	Law et Ngai. 2007	0,354	0,104	0,011	0,151	0,557	3,415	0,001	6,11	7,73
	Hong et Kim. 2002 *	-0,536	0,099	0,010	-0,730	-0,342	-5,414	0,000	6,71	7,76
	Velcu. 2010 *	0,536	0,108	0,012	0,323	0,749	4,942	0,000	5,59	7,69
	Velcu. 2010	0,400	0,108	0,012	0,187	0,613	3,688	0,000	5,59	7,69
	Ehie et Madsen. 2005	0,656	0,174	0,030	0,315	0,998	3,771	0,000	2,17	7,08
	Bernroider. 2008	1,045	0,070	0,005	0,909	1,182	15,004	0,000	13,54	7,95
	Bradford et Florin. 2003 *	0,130	0,144	0,021	-0,153	0,413	0,899	0,369	3,16	7,38
	Bradford et Florin. 2003	0,221	0,144	0,021	-0,062	0,503	1,528	0,127	3,16	7,38
	Ram et al. 2013 (b)	0,203	0,070	0,005	0,066	0,339	2,910	0,004	13,54	7,95
	Bernroider et al. 2014	0,867	0,070	0,005	0,731	1,004	12,448	0,000	13,54	7,95
Fixed		0,374	0,026	0,001	0,324	0,424	14,579	0,000		
Random		0,317	0,129	0,017	0,064	0,569	2,458	0,014		



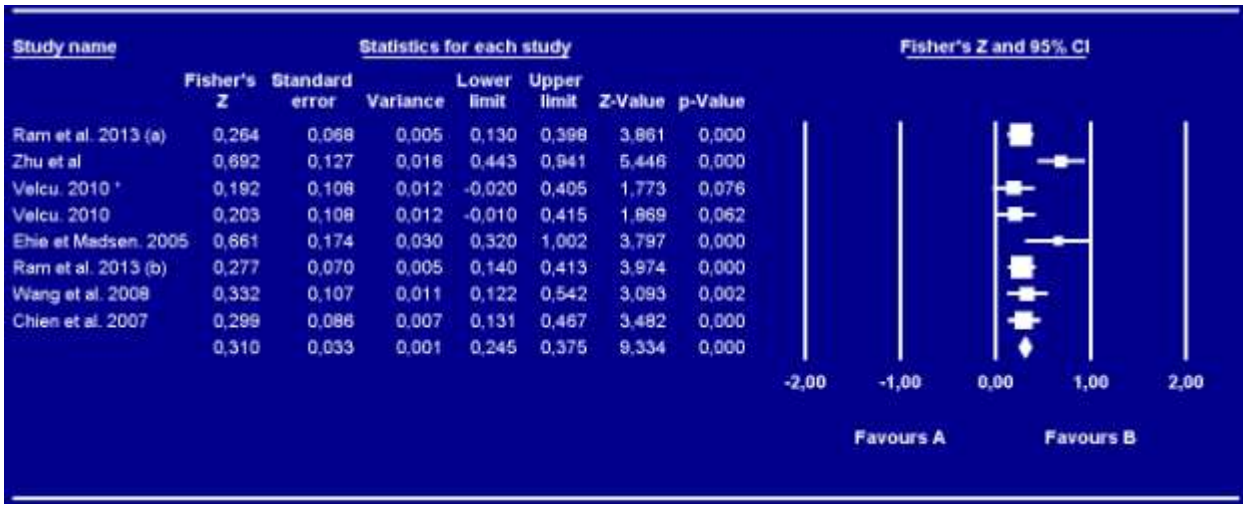
Classic fail-safe N

Z-value for observed studies	12,76917
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	13,00000
Number of missing studies that would bring p-value to > alpha	539,00000

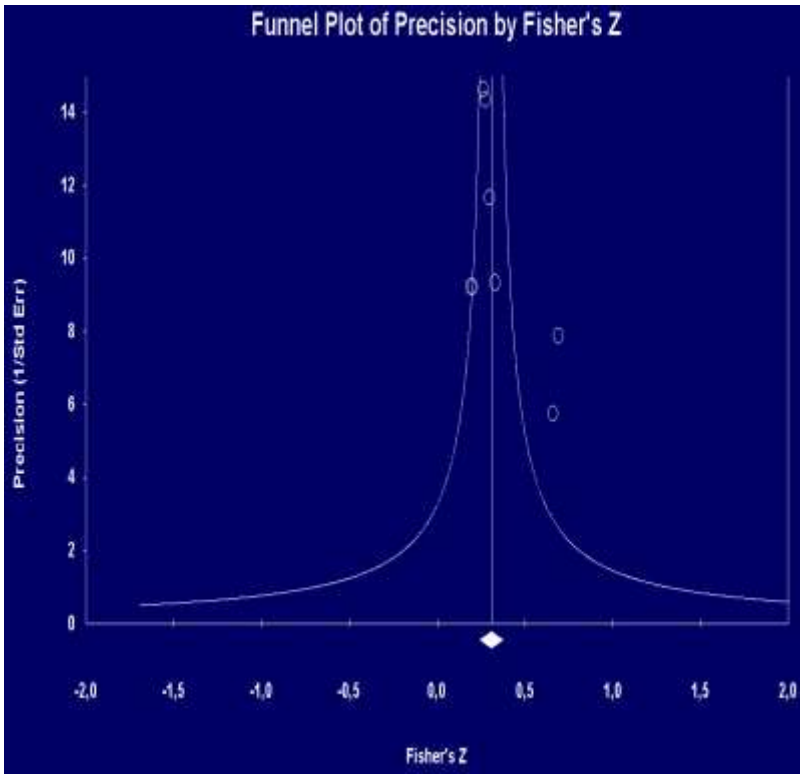
Orwin's fail-safe N

Fisher's Z in observed studies	0,37381
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

Project Management



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Ram et al. 2013 (a)	0,264	0,068	0,005	0,130	0,398	3,861	0,000	23,57	16,85
	Zhu et al	0,692	0,127	0,016	0,443	0,941	5,446	0,000	6,83	9,94
	Velcu. 2010 *	0,192	0,108	0,012	-0,020	0,405	1,773	0,076	9,36	11,78
	Velcu. 2010	0,203	0,108	0,012	-0,010	0,415	1,869	0,062	9,36	11,78
	Ehie et Madsen. 2005	0,661	0,174	0,030	0,320	1,002	3,797	0,000	3,63	6,59
	Ram et al. 2013 (b)	0,277	0,070	0,005	0,140	0,413	3,974	0,000	22,69	16,66
	Wang et al. 2008	0,332	0,107	0,011	0,122	0,542	3,093	0,002	9,58	11,91
	Chien et al. 2007	0,299	0,086	0,007	0,131	0,467	3,482	0,000	14,98	14,49
Fixed		0,310	0,033	0,001	0,245	0,375	9,334	0,000		
Random		0,332	0,053	0,003	0,229	0,435	6,305	0,000		



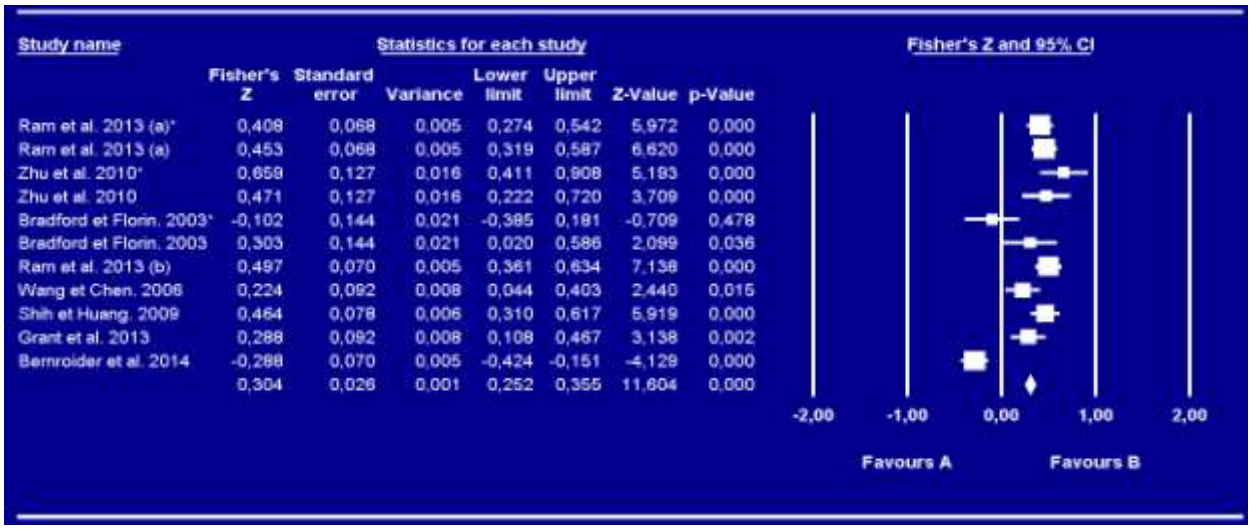
Classic fail-safe N

Z-value for observed studies	9,65034
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	8,00000
Number of missing studies that would bring p-value to > alpha	186,00000

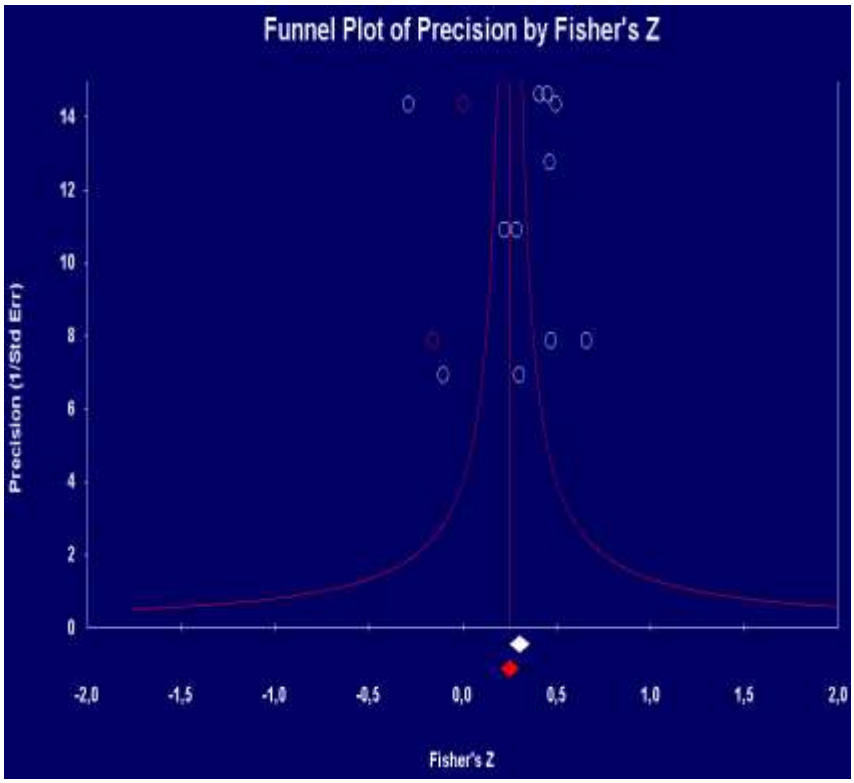
Orwin's fail-safe N

Fisher's Z in observed studies	0,30975
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

ERP Fit



Model	Study name	Statistics for each study							Weight (Fixed)	Weight (Random)
		Fisher's Z	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value	Relative weight	Relative weight
	Ram et al. 2013 (a)*	0.408	0.068	0.005	0.274	0.542	5.972	0.000	14.65	9.70
	Ram et al. 2013 (a)	0.453	0.068	0.005	0.319	0.587	6.620	0.000	14.65	9.70
	Zhu et al. 2010*	0.659	0.127	0.016	0.411	0.908	5.193	0.000	4.24	8.50
	Zhu et al. 2010	0.471	0.127	0.016	0.222	0.720	3.709	0.000	4.24	8.50
	Bradford et Florin, 2003*	-0.102	0.144	0.021	-0.385	0.181	-0.709	0.478	3.29	8.09
	Bradford et Florin, 2003	0.303	0.144	0.021	0.020	0.586	2.099	0.036	3.29	8.09
	Ram et al. 2013 (b)	0.497	0.070	0.005	0.361	0.634	7.138	0.000	14.10	9.68
	Wang et Chen, 2006	0.224	0.092	0.008	0.044	0.403	2.440	0.015	8.15	9.27
	Shih et Huang, 2009	0.464	0.078	0.006	0.310	0.617	5.919	0.000	11.16	9.53
	Grant et al. 2013	0.288	0.092	0.008	0.108	0.467	3.138	0.002	8.15	9.27
	Bernroider et al. 2014	-0.288	0.070	0.005	-0.424	-0.151	-4.129	0.000	14.10	9.68
Fixed		0.304	0.026	0.001	0.252	0.355	11.604	0.000		
Random		0.308	0.089	0.008	0.134	0.482	3.463	0.001		



Classic fail-safe N

Z-value for observed studies	11,27322
P-value for observed studies	0,00000
Alpha	0,05000
Tails	2,00000
Z for alpha	1,95996
Number of observed studies	11,00000
Number of missing studies that would bring p-value to > alpha	353,00000

Orwin's fail-safe N

Fisher's Z in observed studies	0,30358
Criterion for a 'trivial' fisher's z	0,00000
Mean fisher's z in missing studies	0,00000

NOTES