The Way Forward in Oil & Gas Projects: Understanding Complexity through Meta-Analysis

by

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TOPIC

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Research Methodology for Meta-Analysis

Introduction

According to Elo et al (2014), the techniques of systematic quantitative measures are widely used for integrating the findings by means of identifying the research areas. The aspects of statistical approaches are considerably important for evaluating the distinguished measures within the studies. The research areas in this sense are found to be evaluated with respect to social sciences context, which has been widely conducted by means of Meta-Analysis. Wilder (2014) states the concept of Meta-Analysis refers to analyse the aspects of model analysis, which involves the distinguished indicators of research areas. Ruff et al (2014) identify that the meta-analysis approach is effective for distinguishing the attributes of primary and secondary data where the re-evaluation of complete research took place. Watson (2014) found in his study that the primary analysis refers to obtaining relevant information at first hand while the secondary source of data is the existing form of information that has been published or endorsed in respective publications. Adams, Khan and Raeside (2014) observed that the re-evaluation of primary data is performed by answering the questions raised for research areas. The secondary analysis of data is based on answering the research questions relevant to the scope of research by means of utilising the prospect of better statistical techniques. The current research in the same direction is based on performing the meta-analysis of primary research conducted for establishing a comparison between the factors linked to the performance of project management. Meta-analysis is described as a research approach, which presents many elements of comparable empirical studies for evaluating the basis of the relationship between same or different variables. The evaluation is performed in terms of understanding the difference between specific attributes that demonstrate the variation with respect to the positive or negative association. In addition to this, the size of the effect can also form the basis of evaluation with respect to correlation,

however, in most of the cases. The effect size can be ignored which may demonstrate the specification for presenting the degree of the phenomenon in terms of null hypothesis which may be true or false. The meta-analysis in that dimension deals with the context of basic principles that are involved in terms of calculating the effect size and relationship of studies, which may later be converted into the common metric system.

There are particularly three levels of analysis, which specify the context of statistical procedures performed by means of this procedure. The three levels include primary analysis, secondary analysis, and meta-analysis. The meta-analysis thus illustrates the specification for a number of independent studies. The concept of traditional meta-analysis refers to studying the true effects by means of heterogeneous studies, where the overall evaluation is later processed with respect to eliminating the scope of assumptions. The meta-analysis can also be performed in terms of mixed model approach where the true effects can also be studied by means of estimating the heterogeneity and useful information linked with the magnitude of different locations with respect to different subjects (Murad et al, 2014).

Meta-Analysis Justification

Greenhalgh, Howick and Maskrey (2014) claim that the decision based on which meta-analysis is conducted is based on research approach, which is widely considered a form of systematic quantitative review. The phenomenon of research studies is justified in terms of using the relevant factors linked with the scope of meta-analysis, which may be directly faced with the barriers in this research. Robinson (2014) emphasised that the meta-analysis can face a number of barriers such as access to respective information; the measures required validating the accuracy of the data and biased opinions that may deflect the research in the different direction. Mertens (2014) stated that all these barriers could affect the regulations of the result, which compromise the conduct of research in a respective manner. The projects could lead to complicated direction with respect to obtaining respective information. The analysis process is comprehensive which demands the evaluation of data from the different direction, which in this case involves the attributes of the different range of project management factors. This may delay the process and may create confusion in every direction.

Identification studies for the of Meta-Analysis

According to Moher et al (2015), meta-analysis process is composed of four stages, which include the identification of relevant studies, the aspects of eligibility criteria by means of exclusion and inclusion, the extraction of relevant data and the statistical analysis of extracted data. The statistical process is based on exploration of ideas and concepts in more detail with respect to the attributes of heterogeneity and homogeneity. However, Chen, Mao and Liu (2014) claim that the advanced approaches of research should be adopted for clarifying the substitutes of assumptions and interests. The criteria for selecting and identifying the basis of the hypothesis, the approaches of extraction and analysis of information are effectively performed.

Data Collection

According to Mertens (2014), the data collection can be performed by means of two sources, which include primary and secondary sources. The form of data as collected by means of primary sources, which may not require the identification of individual representation, however, collective opinions are respectively important for presenting the basis of first-hand information. Cunningham et al (2014) mention in their study that the secondary sources, in the same manner, refer to the collection of data and respective information by means of existing sources, which are evaluated in terms of credibility and reliability. The extraction of information from valued sources refers to ensure the basis of reliability and credibility with respect to structured format as obtained by means of primary and secondary sources. The data collection will be further explored in Chapter 4.

Limitations of Meta-Analysis

Corstens et al (2014) and Mertens (2014) stress that the aspects of meta-analysis refer to developing the measure of concerns that might remain unsettled. The critical review is considered as one of the most important parts of the research. The construct of poorly designed research may also become part of the study that can make the context of the research over-assumed. The biased opinions of the research may formulate the basis of presenting comparisons with respect to published and unpublished materials. The attention is provided to raise the respective concern by means of calculating the effect size and problems. The utilisation of meta-analysis refers to research synthesis that may also include the context of determined approaches. The ambition of conducting the research forms the basis of obtaining respective information that

demonstrates the emphasis in terms of statistical significance that can be only addressed by means of null results.

Research Design

For Mishra, Pundir and Ganapathy (2014) the research design refers to review the literature, which is majorly depicted with respect Chapter 2. The literature covers the wide range of specification in terms of analysing complexity factors, which would present effect on project management performance. The research limitations in the context of the literature review are enormous which are required to be addressed in order to deal with complexity factors involved in project management. According to Korir (2014), the elements of the theoretical model are applied for reducing the complexity of research. The elements of project management and complexity must be based on studying the overall impact on performance. The project management motivation may also confuse the use of modern approaches and tools. The attributes of complexity factors may also be based on addressing the level of project management outcomes. Meta-analysis is utilised for studying the level of correlation between focus and complexity that are related with the mode of investigations to be carried out. The categorisation of factors is as follows:

- **Technical Category (Group A)**

A1: The project goals in reference to non-alignment have a significant influence on project complexity.

A2: The project complexity and clarity of goals are considerably related.

A3: The project complexity and project team competency with respect to technical perspective are considerably related.

A4: The project complexity and technical complexity are considerably related,

- **Organisational Category (Group B)**

B1: The project complexity and financial risks are considerably related to increased proportion of complexity.

B2: The project complexity and project leadership are considerably related to increased proportion of complexity.**B3:** The project complexity and projects management complexity are considerably related to increased proportion of complexity.

- **Project Environment category (Group C)**

C1: The project complexity and safety of the environment in terms of region, country, and city are considerably related to increased proportion of complexity.

C2: The project complexity and political stability of environment in terms of region, country and city are considerably important for increased proportion of complexity.

C3: The project complexity and instability of oil prices are considerably related to increased proportion of complexity.

- **Health, Safety, and Environment (HSE) (Group D)**

D1: The project complexity and operational risks are considerably related to increased proportion of complexity.

D2: The project complexity and corporate environmental responsibilities are considerably related to increased proportion of complexity.

D3: The project complexity and project location safety and security concerns are considerably related to increased proportion of complexity.

- **Project Management in Complexity (Group E)**

E1: The task dependence has a significant impact on increasing project complexity.

E2: The utilisation of technology and its interdependence has a significant impact on increasing project complexity.

E3: The compatibility of project management tools and techniques has a significant impact on increasing project complexity.

E4: The interfaces of particular disciplines have a significant impact on increasing project complexity.

E5: The number of different cultures has a significant impact on increasing project complexity.

E6: The organisational interdependence has a significant impact on increasing project complexity.

E7: The team and stakeholder's communication has a significant impact on increasing project complexity.

E8: The change in project environment has a significant impact on increasing project complexity.

E9: The government interaction and regulations has a significant impact on increasing project complexity.

E10: The influence of media has a significant impact on increasing project complexity.

Conclusion

The overall examination of this chapter provides the basis for understanding and experimenting different factors linked with the scope of meta-analysis. The area of research is focused on respect project management performance, which is evaluated with respect to metal analysis. The detailed consideration is required be ensured and further explored by means of analysis and research which can be obtained in terms of practical nature.

Chapter 4 – Data Analysis

Study characteristic	Importance index
Maylor et al. (2008)	0.10
Remington and Pollack (2007)	025
CIFTER (2007)	0.15
Lessard et al. (2014)	0.10
Shane et al. (2013)	0.05
Bosch-Rekveldt et al. (2011)	0.05
Geraldi and Adlbrecht (2007)	0.12
Remington and Pollack (2007)	0.20
Xia and Lee (2004)	0.12
Williams (1999)	0.20
Bacarini (1996)	0.30
Shenhar and Dvir (1996)	0.10
Lessard et al. (2014)	0.40

Shane et al. (2013)	0.15
Bosch-Rekveldt et al. (2011)	0.15
Geraldi and Adlbrecht (2007)	0.15
Remington and Pollack (2007)	0.20
Shenhar and Dvir (2007)	0.15
Xia and Lee (2004)	0.10
Bacarini (1996)	0.35
Lu et al. (2015)	0.20
Shane et al. (2013)	0.30
Geraldi et al. (2011)	0.15
Haas (2009)	0.25
Maylor et al. (2008)	0.10
Geraldi and Adlbrecht (2007)	0.10
Remington and Pollack (2007)	0.05
CIFTER (2007)	0.20
Xia and Lee (2004)	0.05
Williams (1999)	0.05
Baccarini (1996)	0.05
Lu et al. (2015)	0.15
Shane et al. (2013)	0.10
Geraldi, (2009)	0.30
Remington & Pollack (2007)	0.25
Lu et al. (2015)	0.05
Remington and Pollack (2007)	0.05
Cicmil and Marshall (2005)	0.01
Lessard et al. (2014)	0.10
Maylor et al. (2008)	0.15
CIFTER (2007)	0.10
Cicmil and Marshall (2005)	0.05
Shenhar and Dvir (1996)	0.05

Lu et al. (2015)	0.20
Lessard et al. (2014)	0.15
Cicmil and Marshall (2005)	0.10
Lu et al. (2015)	0.10
Lessard et al. (2014)	0.15
Shane et al. (2013)	0.10
CIFTER (2007)	0.13
Lu et al. (2015)	0.20
Haas (2009)	0.15
Maylor et al. (2008)	0.20
Cooke-Davies et al. (2007)	0.25
Geraldi and Adlbrecht (2007)	0.30
Remington and Pollack (2007)	0.20
Jaafari (2003)	0.35
Bacarini (1996)	0.45
Lu et al. (2015)	0.05
Maylor et al. (2008)	0.05
Xia and Lee (2004)	0.15
Lu et al. (2015)	0.10
Haas (2009)	0.10
Maylor et al. (2008)	0.05
Cooke-Davies et al. (2007)	0.10
Remington and Pollack (2007)	0.25
Xia and Lee (2004)	0.05
Jaafari (2003)	0.05
Lu et al. (2015)	0.05
Lessard et al. (2014)	0.10
Geraldi and Adlbrecht (2007)	0.05
Maylor et al. (2008)	0.10
Lessard et al. (2014)	0.10

Haas (2009)	0.05
Maylor et al. (2008)	0.05
Cooke-Davies et al. (2007)	0.10
Geraldi and Adlbrecht (2007)	0.15
Remington and Pollack (2007)	0.10
Jaafari (2003)	0.05
Bacarini (1996)	0.15
Lessard et al. (2014)	0.20
Bosch-Rekveldt et al. (2011)	0.15
Geraldi et al. (2011)	0.05
Maylor et al. (2008)	0.25
Geraldi and Adlbrecht (2007)	0.20
Remington and Pollack (2007)	0.15
CIFTER (2007)	0.10
Xia and Lee (2004)	0.05
Bacarini (1996)	0.05
Maylor et al. (2008)	0.35
Remington and Pollack (2007)	0.15
Xia and Lee (2004)	0.20
Bacarini (1996)	0.05
Shenhar and Dvir (1996)	0.05
Lessard et al. (2014)	0.15
Gransberg et al. (2013)	0.15
Geraldi et al. (2011)	0.20
CIFTER (2007)	0.05

Methodology

Quantitative Analysis

According to the study of Elo et al (2014), the quantitative synthesis was of the available data was performed in Comprehensive Meta-Analysis V2. The effect size was point estimate.

Both Q-test and I2 test were used to assess the statistical heterogeneity of the included studies. An I^2 value greater than 50% indicated significant heterogeneity across studies. This research used the analytical statistics with 95% confidence interval (CI) to determine the effect size. The significance of the pooled OR was determined by the Z-test (P, 0.05 was considered statistically significant). Johnson (2014) states a random- or fixed-effects model was used to calculate pooled effect estimates in the presence ($P < 0.05$) or absence ($P > 0.05$) of heterogeneity, respectively. To assess the degree of potential publication bias graphically we used funnel plots.

Results

Clarity of Goals

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	9	0.076	0.015	0.000	0.046	0.105	5.077	0.000	8.582	8	0.379
Random	9	0.079	0.016	0.000	0.047	0.111	4.889	0.000			

The relationship between clarity of goals and project complexity is analysed which provided the Z value to be 5.077 for fixed model while 4.889 for the random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 8 that collectively reflected P-Value 0.3379.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
6.785	0.000	0.001	0.000	0.013

The relationship between clarity of goals and project complexity is analysed which provided the Tau value to be 0.013 and variance of 0.000, with respect to heterogeneity.

Technical Complexity

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	8	0.148	0.029	0.001	0.092	0.205	5.156	0.000	3.948	7	0.786
Random	8	0.148	0.029	0.001	0.092	0.205	5.156	0.000			

The relationship between technical complexity and project complexity is analysed which provided the Z value to be 5.156 for fixed model while 5.156 for the random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 7 that collectively reflected P-Value 0.786.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
0.000	0.000	0.004	0.000	0.000

The relationship between technical complexity and project complexity is analysed which provided the Tau value to be 0.000 and variance of 0.000, with respect to heterogeneity.

Corporate Environmental Responsibilities

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	4	0.113	0.029	0.001	0.056	0.170	3.865	0.000	0.427	3	0.935
Random	4	0.113	0.029	0.001	0.056	0.170	3.865	0.000			

The relationship between Corporate Environmental Responsibilities and project complexity is analysed which provided the Z value to be 3.865 for fixed model while 3.865 for the random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 3 that collectively reflected P-Value 0.935.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
0.000	0.000	0.003	0.000	0.000

The relationship between Corporate Environmental Responsibilities and project complexity is analysed which provided the Tau value to be 0.000 and variance of 0.000, with respect to heterogeneity.

Dependencies between Tasks

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	8	0.214	0.040	0.002	0.134	0.293	5.279	0.000	2.772	7	0.905
Random	8	0.214	0.040	0.002	0.134	0.293	5.279	0.000			

The relationship between dependencies between tasks and project complexity is analysed which provided the Z value to be 0.293 for fixed model while 0.293for random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 7 that collectively reflected P-Value 0.905.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
0.000	0.000	0.007	0.000	0.000

The relationship between dependencies between tasks and project complexity is analysed which provided the Tau value to be 0.000 and variance of 0.000, with respect to heterogeneity.

Financial Risks

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	11	0.065	0.012	0.000	0.042	0.088	5.494	0.000	11.443	10	0.324
Random	11	0.069	0.013	0.000	0.042	0.095	5.084	0.000			

The relationship between financial risks and project complexity is analysed which provided the Z value to be 5.494 for fixed model while 5.084 for the random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 10 that collectively reflected P-Value 0.324.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
12.613	0.000	0.001	0.000	0.016

The relationship between financial risks and project complexity is analysed which provided the Tau value to be 0.016 and variance of 0.000, with respect to heterogeneity.

Operational Risks and Effect on People and Process

Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	3	0.128	0.039	0.002	0.051	0.205	3.256	0.001	0.881	2	0.644
Random	3	0.128	0.039	0.002	0.051	0.205	3.256	0.001			

The relationship between operational risks and project complexity is analysed which provided the Z value to be 3.256 for fixed model while 3.256 for the random model. The P-Value in this respect for both models is found to be 0.001, which shows the significance in the relationship. The differentiation is obtained to be 2 that collectively reflected P-Value 0.644.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
0.000	0.000	0.006	0.000	0.000

The relationship between financial risks and project complexity is analysed which provided the Tau value to be 0.000 and variance of 0.000, with respect to heterogeneity.

Project Leadership

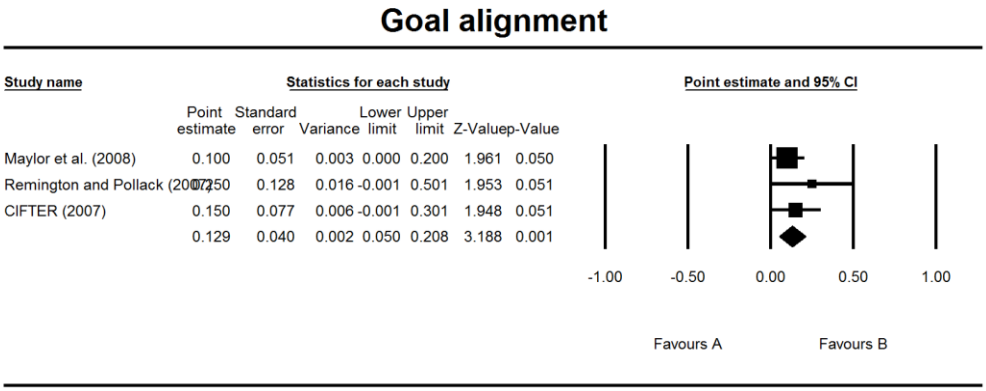
Model		Effect size and 95% confidence interval					Test of null (2-Tail)		Heterogeneity		
Model	Number Studies	Point estimate	Standard error	Variance	Lower limit	Upper limit	Z-value	P-value	Q-value	df (Q)	P-value
Fixed	4	0.140	0.039	0.002	0.063	0.216	3.583	0.000	2.464	3	0.482
Random	4	0.140	0.039	0.002	0.063	0.216	3.583	0.000			

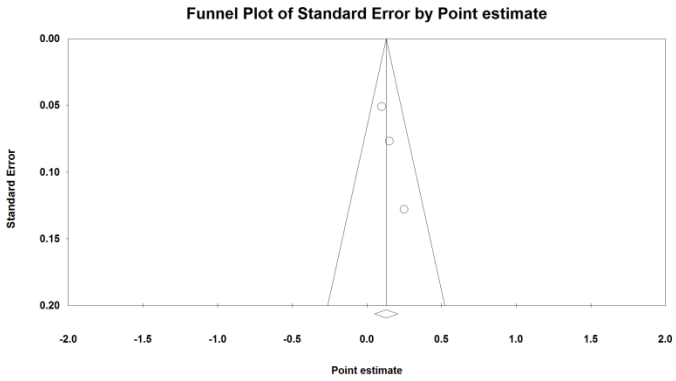
The relationship between project leadership and project complexity is analysed which provided the Z value to be 3.583 for fixed model while 3.583 for the random model. The P-Value in this respect for both models is found to be 0.000, which shows the significance in the relationship. The differentiation is obtained to be 3 that collectively reflected P-Value 0.482.

Heterogen	Tau-squared			
I-squared	Tau Squared	Standard Error	Variance	Tau
0.000	0.000	0.006	0.000	0.000

The relationship between project leadership and project complexity is analysed which provided the Tau value to be 0.000 and variance of 0.000, with respect to heterogeneity.

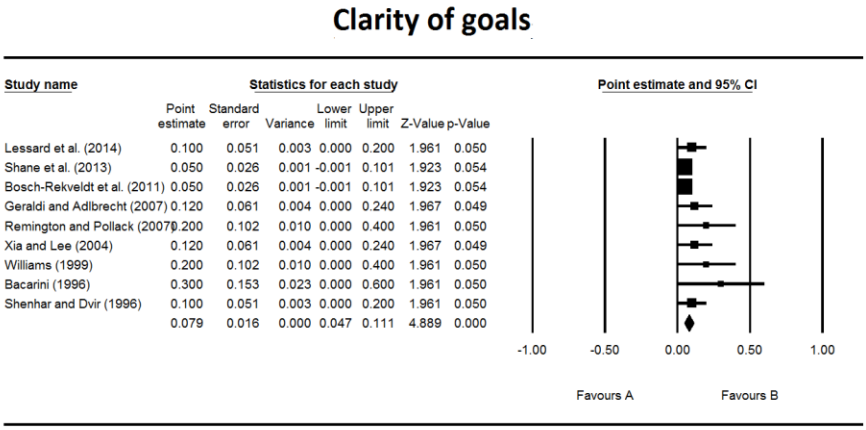
A1: Goal Alignment

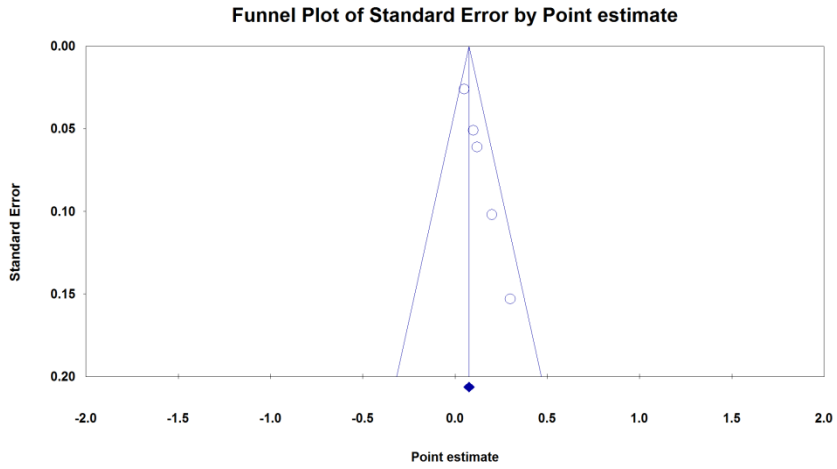




The pooled estimate of the Goal alignment was 0.129 95% CI (0.050 – 0.208). There was no significant heterogeneity existed in this meta-analysis. So, fixed effects model was used.

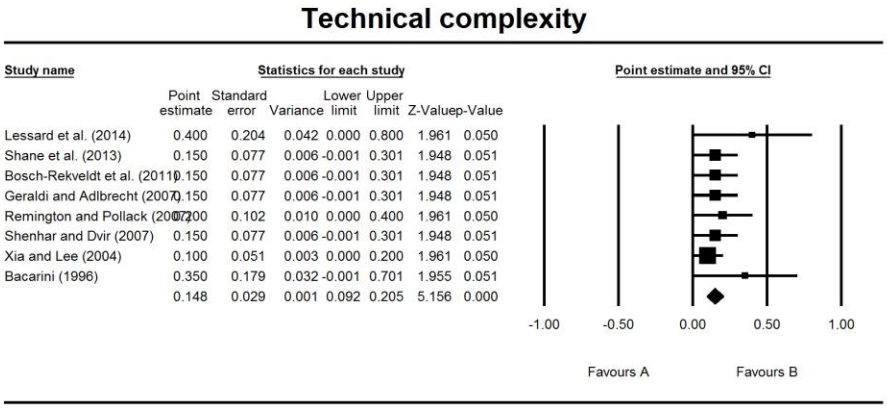
A2: Clarity of Goals

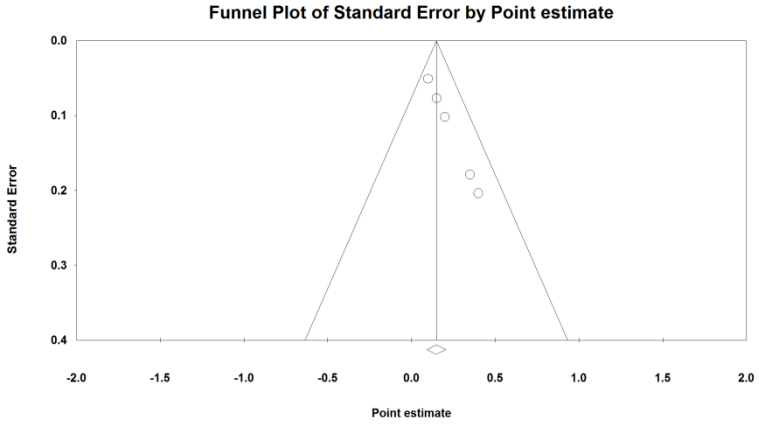




The pooled estimate of the Clarity of goals was 0.079 95% CI (0.047 – 0.111). There was no significant heterogeneity existed (Q = 8.582 and I^2= 6.785) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

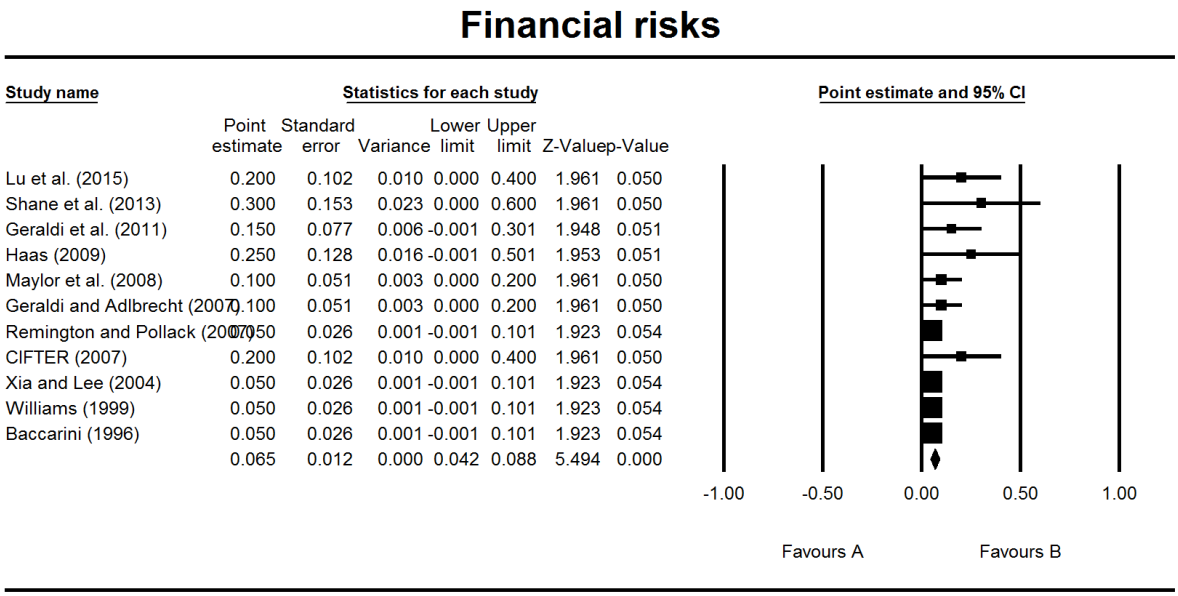
A5 Technical Complexity

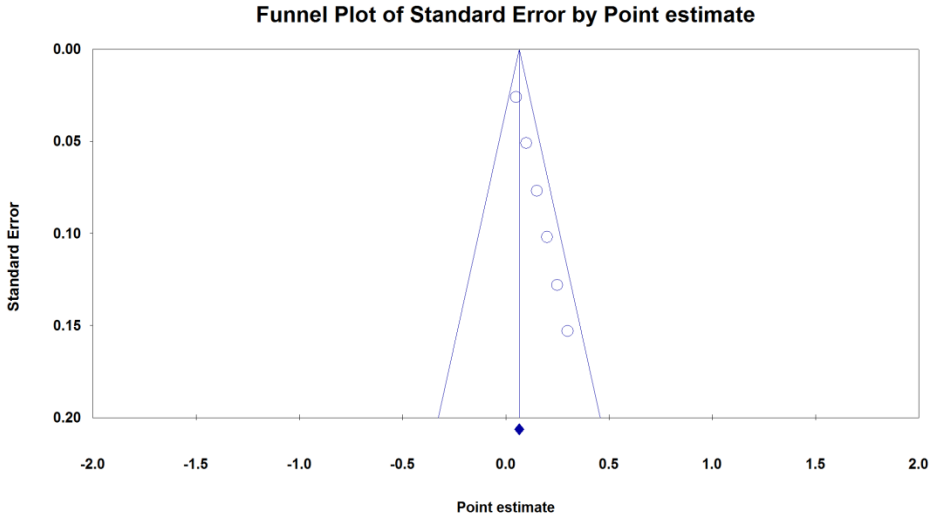




The pooled estimate of the Technical complexity was 0.148 95% CI (0.092 – 0.205). There was no significant heterogeneity existed (Q = 3.984 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

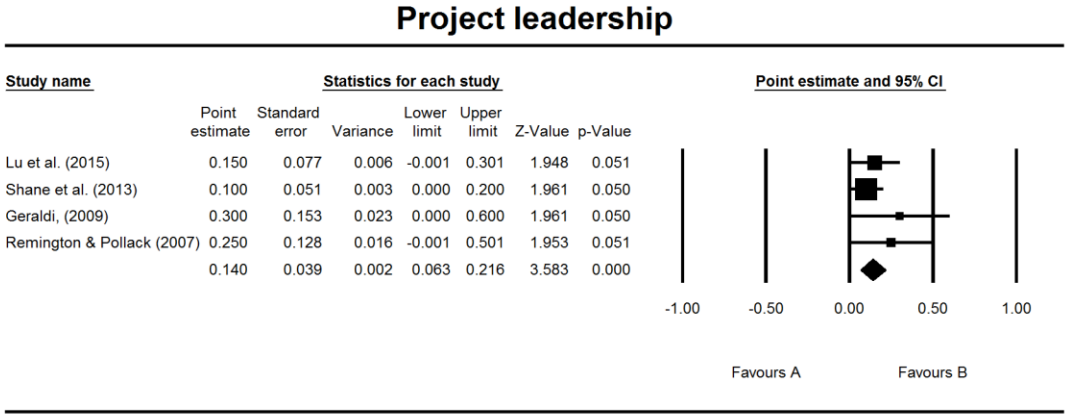
B1: Financial Risks

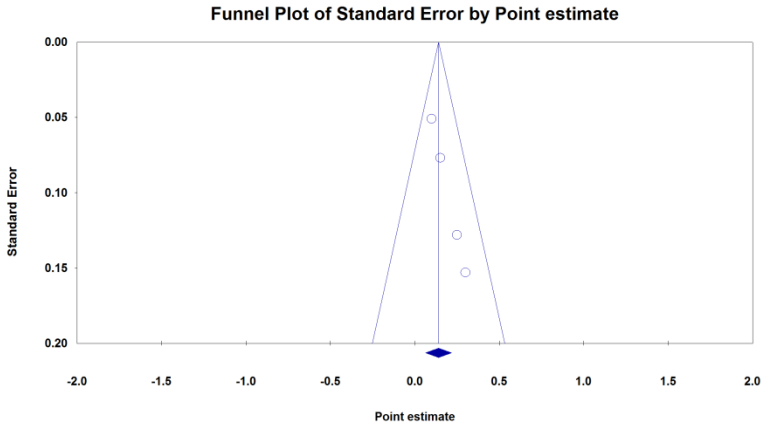


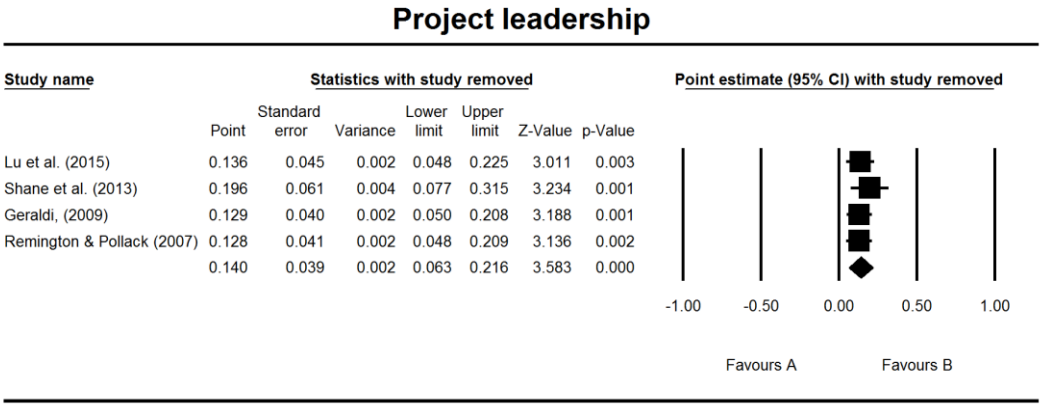


The pooled estimate of the Financial risks was 0.065 95% CI (0.042 – 0.088). There was no significant heterogeneity existed (Q = 11.443 and I^2 = 12.613) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

B2: Project Leadership

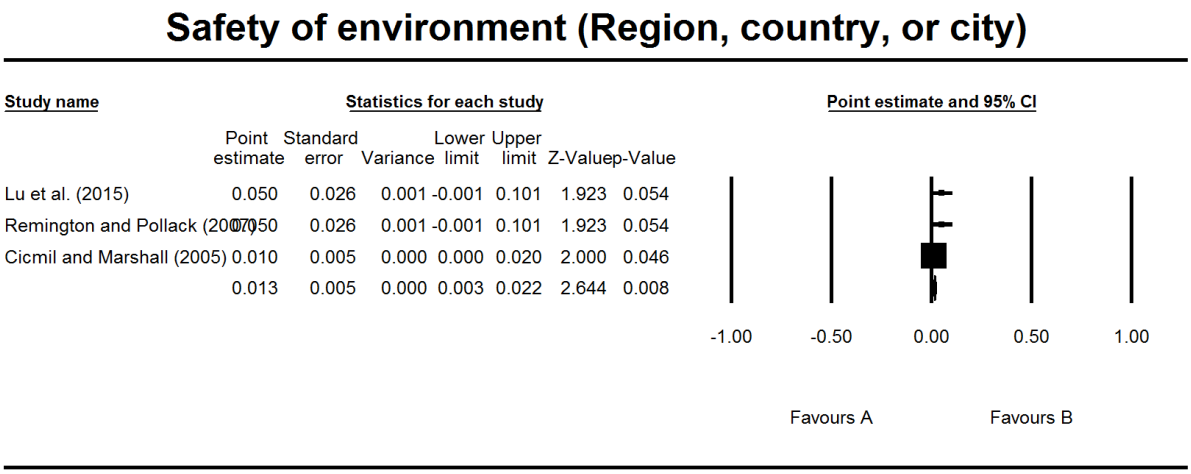


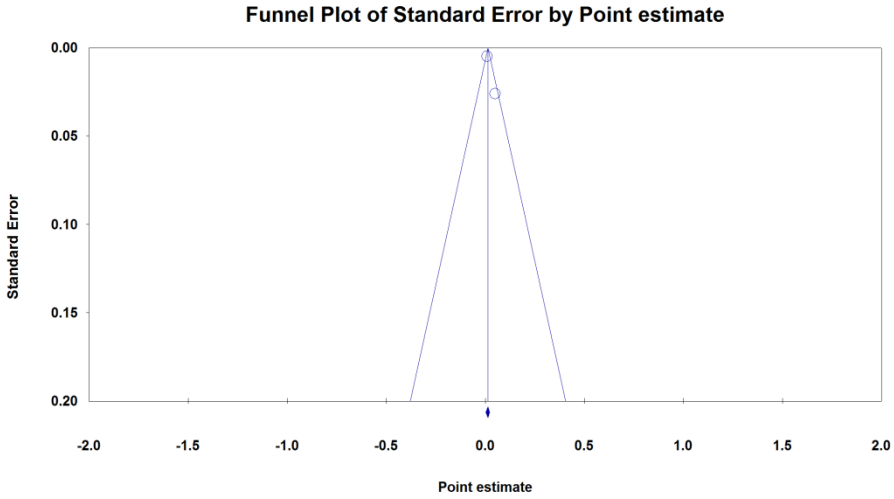




The pooled estimate of the Financial risks was 0.140 95% CI (0.063 – 0.216). There was no significant heterogeneity existed (Q = 2.464 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

C1: Safety of Environment (Region, country, or city)





The pooled estimate of the Financial risks was 0.013 95% CI (0.003– 0.022). There was no significant heterogeneity existed (Q = 2.374 and I^2= 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias

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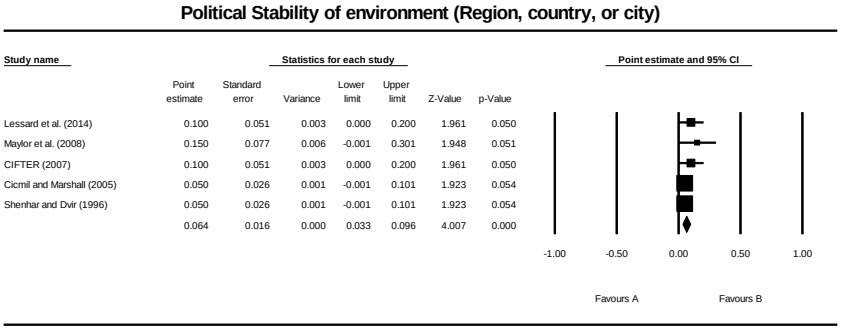
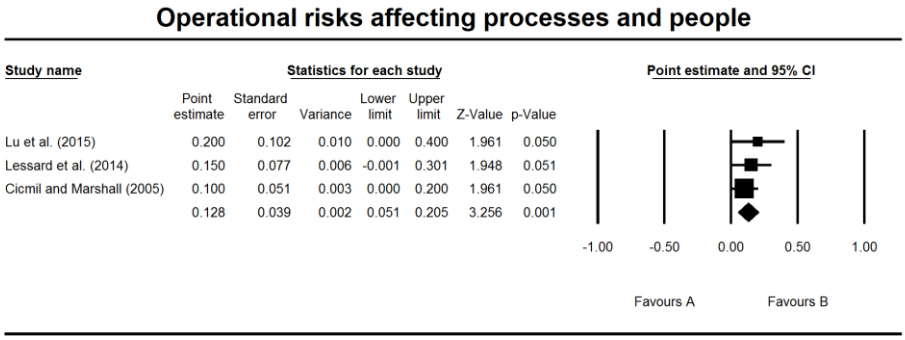
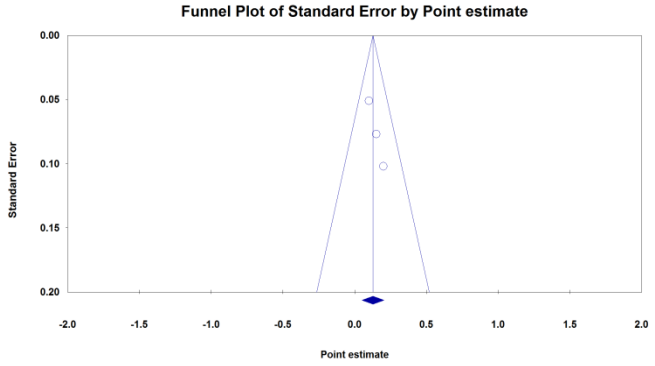
C2: Political Stability of Environment (Region, country, or city)

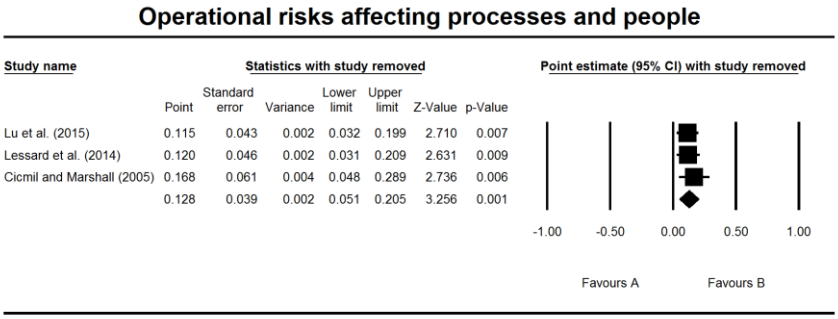


The pooled estimate of the Political Stability of environment (Region, country, or city) was 0.064 95% CI (0.033– 0.096). There was no significant heterogeneity existed (Q = 4.374 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

D1: Operational Risks Affecting Processes and People

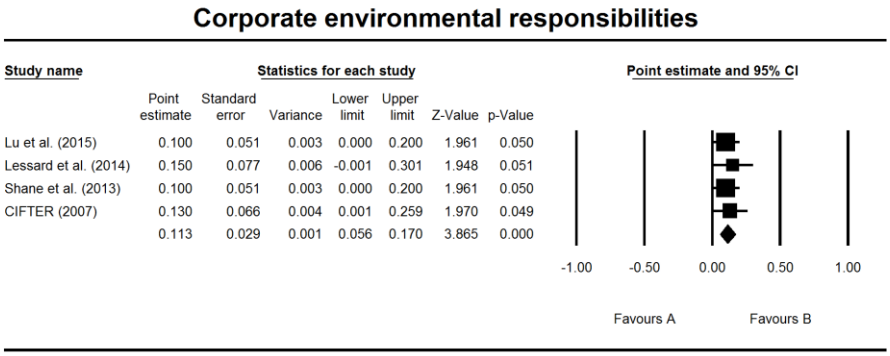


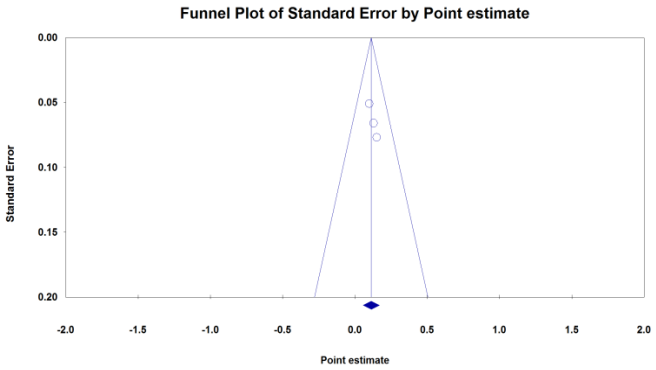




The pooled estimate of the Operational risks affecting processes and people was 0.126 95% CI (0.051– 0.205). There was no significant heterogeneity existed (Q = 0.881 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

D2: Corporate Environmental Responsibilities

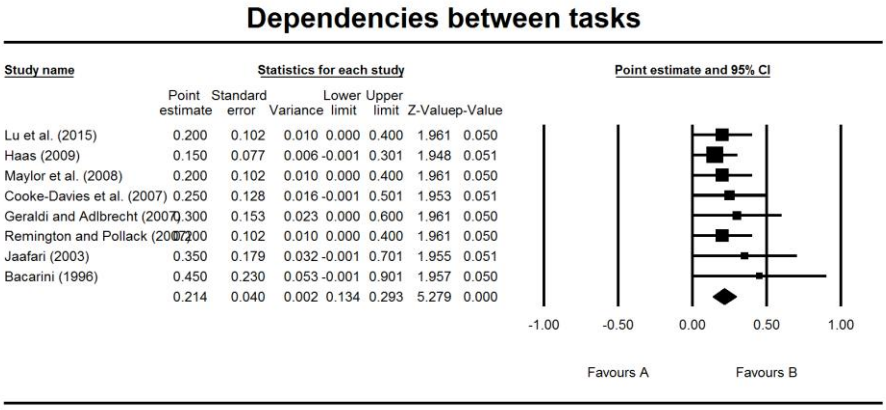


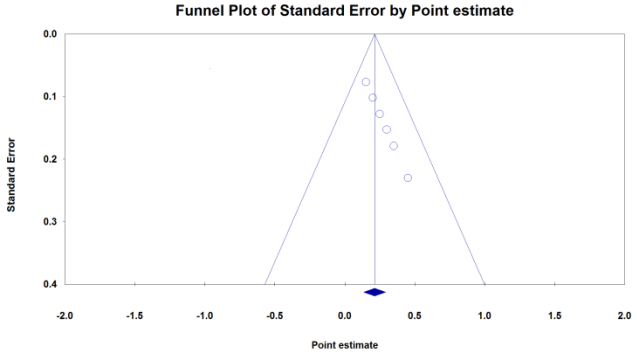


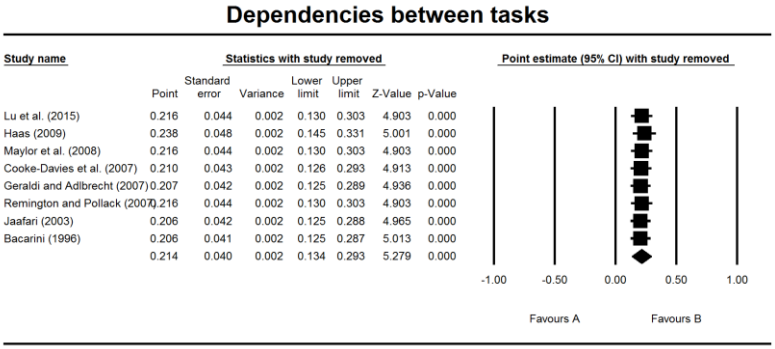
The pooled estimate of Corporate environmental responsibilities was 0.113 95% CI (0.056– 0.170). There was no significant heterogeneity existed (Q = 0.427 and I^2 = 0.00) in this

meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

E1: Dependencies between Tasks

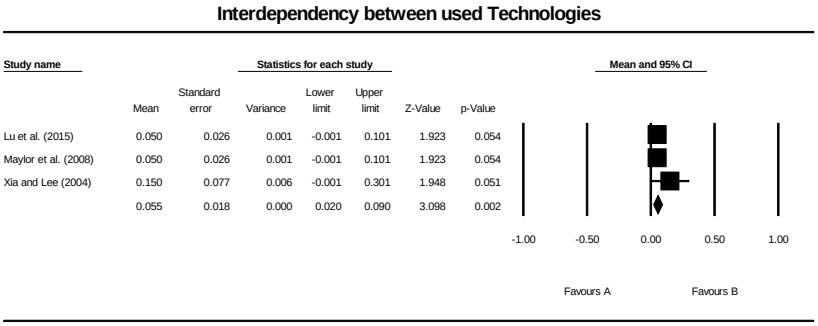






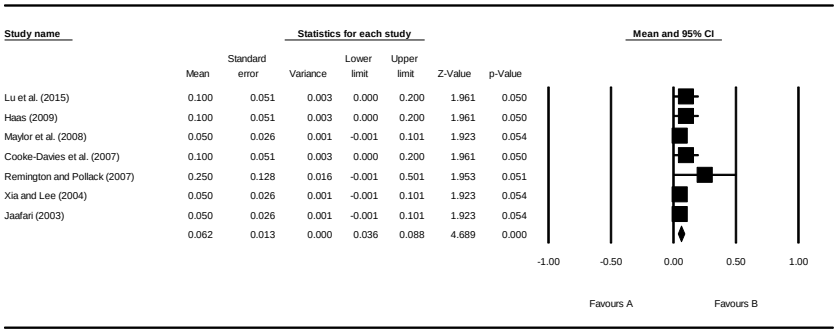
The pooled estimate of Corporate environmental responsibilities was 0.214 95% CI (0.134– 0.293). There was no significant heterogeneity existed (Q = 2.772 and I^2= 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias (Cornel et al, 2014).

E2: Interdependency between Used Technologies

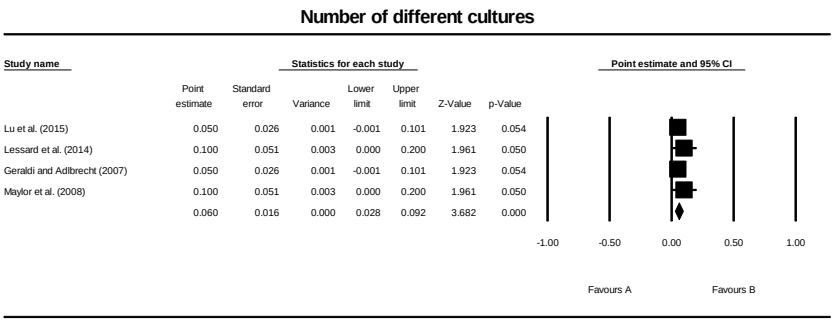


The pooled estimate of Interdependency between used Technologies was 0.055 95% CI (0.020 – 0.090). There was no significant heterogeneity existed (Q = 1.596 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias (Carter and McCullough, 2014).

E4: Interfaces between Different Disciplines



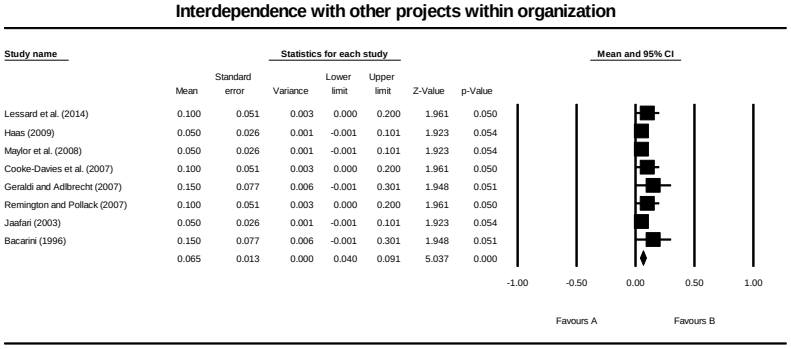
The pooled estimate of Interfaces between different disciplines was 0.062 95% CI (0.036 – 0.088). There was no significant heterogeneity existed (Q = 4.464 and I^2= 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.



E5: Number of Different Cultures

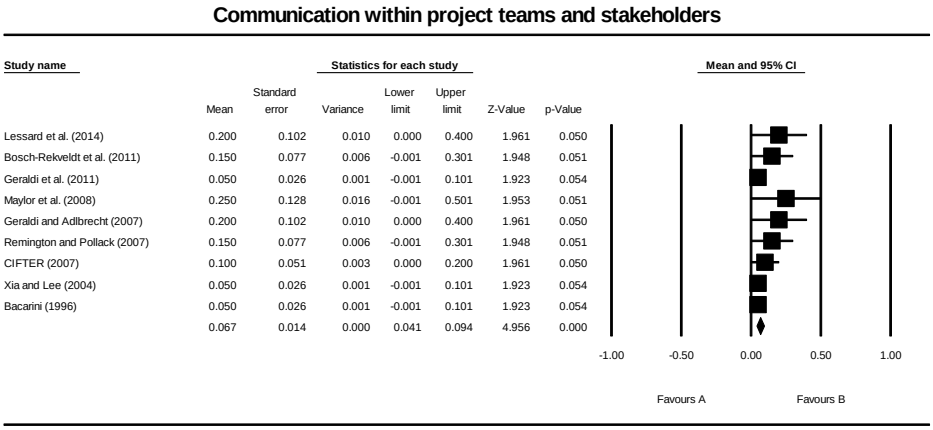
The pooled estimate of Number of different cultures was 0.060 95% CI (0.028 – 0.092). There was no significant heterogeneity existed (Q = 1.526 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

E6: Interdependence with other Projects within Organisation



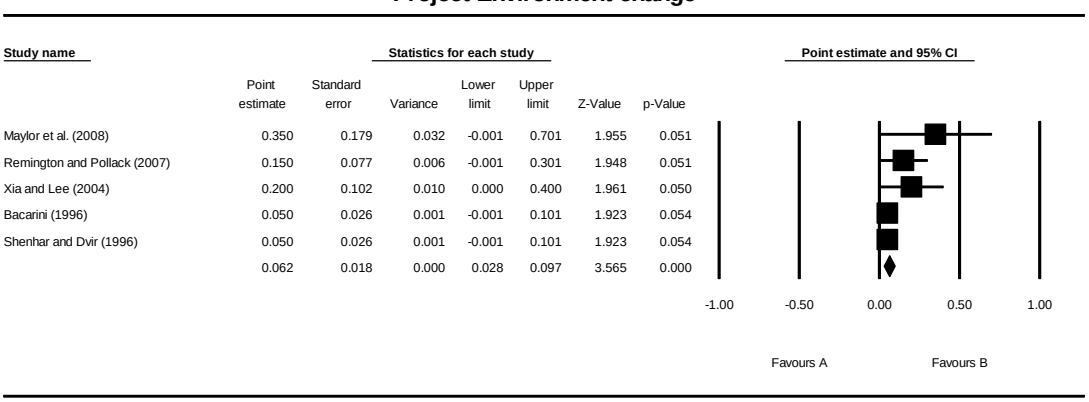
The pooled estimate of Interdependence with other projects within the organisation was 0.065 95% CI (0.040 –0.091). There was no significant heterogeneity existed (Q = 4.848 and I^2 = 0.00) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

E7: Communication within Project Teams and stakeholders



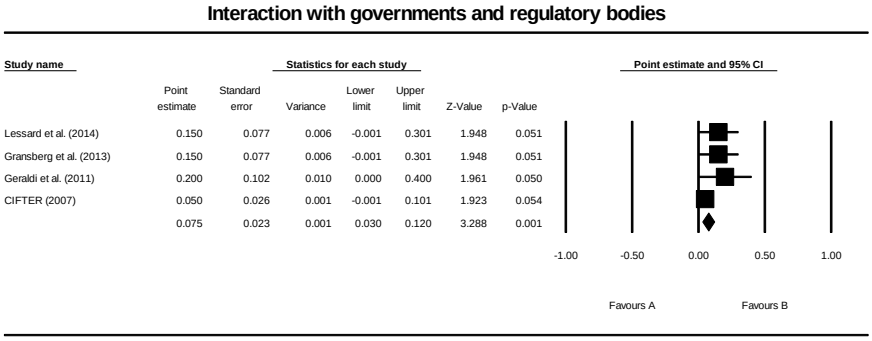
The pooled estimate of Communication within project teams and stakeholders were 0.064 95% CI (0.041 – 0.094). There was no significant heterogeneity existed (Q = 8.855 and I^2 = 9.655) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

E8: Project Environment Change



The pooled estimate of Project Environment change was 0.062 95% CI (0.028 – 0.097). There was no significant heterogeneity existed (Q = 6.151 and I^2 = 34.965) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

E9: Interaction with Governments and Regulatory Bodies



The pooled estimate of Interaction with governments and regulatory bodies was 0.075 95% CI (0.030 – 0.120). There was no significant heterogeneity existed (Q = 4.324 and I^2 = 30.161) in this meta-analysis. So, fixed effects model was used. The Funnel Plot showed that there exists no publication bias.

Results	
Main factors of projects complexity	Effect Estimate 95% CI
A1: Goal alignment	0.129 95% CI (0.050 – 0.208)
A2: Clarity of goals	0.079 95% CI (0.047 – 0.111)
A5 Technical complexity	0.148 95% CI (0.092 – 0.205)
B1: Financial risks	0.065 95% CI (0.042 – 0.088)
B2: Project leadership	0.140 95% CI (0.063 – 0.216)
C1: Safety of environment (Region, country, or city)	0.013 95% CI (0.003– 0.022)
C2: Political Stability of environment (Region, country, or city)	0.064 95% CI (0.033– 0.096)
D1: Operational risks affecting processes and people	0.126 95% CI (0.051– 0.205)
D2: Corporate environmental responsibilities	0.113 95% CI (0.058– 0.170)
E1: Dependencies between tasks	0.214 95% CI (0.134– 0.293)
E2: Interdependency between used Technologies	0.055 95% CI (0.020 – 0.090)

E4: Interfaces between different disciplines	0.062 95% CI (0.036 – 0.088)
E5: Number of different cultures	0.060 95% CI (0.023 – 0.092)
E6: Interdependence with other projects within organisation	0.065 95% CI (0.040 – 0.091)
E7: Communication within project teams and stakeholders	0.064 95% CI (0.041 – 0.094)
E8: Project Environment change	0.062 95% CI (0.028 – 0.097)
E9: Interaction with governments and regulatory bodies	0.075 95% CI (0.030 – 0.120)

Conclusion

In conclusion, it is addressed that the aspects of statistical approaches are considerably important for evaluating the distinguished measures within the studies. It involves characteristic approaches of fundamental principles on the basis of which respective evaluation methods are compared. The overall implication of this study obtained a strategic framework of \analytical context through which different research areas can be tapped and further explored in the most effective manner. The current research in the same direction is based on performing the meta-analysis of primary research conducted for establishing a comparison between the factors linked to the performance of project management. Meta-analysis is described as a research approach, which presents many elements of comparable empirical studies for evaluating the basis of the relationship between same or different variables. Meta-analysis process is composed of four stages, which include the identification of relevant studies, the aspects of eligibility criteria by means of exclusion and inclusion, the extraction of relevant data and the statistical analysis of extracted data.

Recommendations

Meta-analysis turns out to be really powerful tolls with respect to combining results from studies having similar design and scope of demonstration. In this manner, it is believed that the design of appropriate questions must be formulated in order to ensure the specification of this approach. The common flaws with respect to metal analysis must be diminished by ensuring the concepts of homogeneity and heterogeneity. The constitution of thoughtful abstraction must be applied in terms of dealing with the issues of heterogeneity. In terms of meta-analysis, the effect size can be

ignored which may demonstrate the specification for presenting the degree of the phenomenon in terms of null hypothesis which may be true or false.

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