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# Is organizational commitment-job satisfaction relationship necessary for organizational commitment-citizenship behavior relationships? A Meta-Analytical Necessary Condition Analysis

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## ABSTRACT

Meta-analyses on the relationships of organisational commitment (OC), job satisfaction (JS) and organisational citizenship behaviour (OCB) have been used to assess necessity of one another by evaluating their causality through the notion of sufficiency. This study applies necessity condition analysis (NCA) on  $r$  values collected from a systematic review of the relationship between OC, JS, and OCB and tests their relations under the notion of necessity. Two meta-analyses were performed on 140 error adjusted effects reported from 70 studies which fulfilled study's selection and inclusion criteria. Meta-analytical results provided positive and significant OC–JS ( $\bar{r} = 0.546$ ) and OC–OCB ( $\bar{r} = 0.374$ ) relationships. NCA scatterplot, statistics, and bottleneck analysis confirmed the necessity of OC–JS relationship for medium and high level of the desired OC–OCB relation. This study fulfilled the literature gap on the mutual relationship of OC, JS, and OCB by focusing on the notion of necessity rather than the traditional employed notion of sufficiency through a novel method that is testing necessity hypotheses through meta-analyses. For researchers, this method provides a novel approach to analyse meta-analytical data, while enabling practitioners for identifying and focusing on necessary relationships rather than diverging their energies and resources on factors that partially affect the outcomes.

## ARTICLE HISTORY

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organisational commitment (OC); job satisfaction (JS); organisational citizenship behaviour (OCB); meta-analysis; necessary condition analysis (NCA)

## JEL CLASSIFICATIONS

C18; C19

## 1. Introduction

Behaviours that are considered outside the formal job requirements of an employee but assist in making the firm a better place and contributes towards the effective functioning of the firm, are collectively termed as organisational citizenship

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behaviours (OCB). The importance of OCB has been proven at multiple levels in the organisation. It is believed to act as a catalyst to improve task, activities, and processes by shaping organisational, psychological and social constructs (Borman & Motowidlo, 1997). It is also proven from research that employee display of OCBs tends to receive favourable evaluations from their peers and supervisors, and greater formal and informal rewards.

OCB has been associated with several desirable personal and organisational constructs and much research has been conducted on the antecedents of OCB. Among these studies, organisational commitment (OC) has been repeatedly studied as an antecedent of OCB (e.g., Motaung, 2016; Prasetio, Yuniarsih, & Ahman, 2017; Williams & Anderson, 1991; Zeinabadi, 2010). The majority of these studies present a significant positive relationship between OC and OCB. Previous meta-analyses on the relationship of OC and OCB reports a significant positive relationship between them (Cetin, Gürbüz, & Sert, 2015; Gürbüz, Enstitüsü, et al., 2014; LePine, Erez, & Johnson, 2002; Meyer, Stanley, Herscovitch, & Topolnytsky, 2002; Podsakoff, Whiting, Podsakoff, & Blume, 2009). However, these meta-analyses also show that the relationship of continuance commitment and different facets of OCB as consistently negative or insignificant. Furthermore, we also find some studies that present a non-significant relationship between these constructs.

Understanding the processes related to OC have considerable social, organisational and individual implications and makes the employee more entitled to collect both extrinsic and psychological benefits for organisational membership. The reciprocal effects of OC and job satisfaction (JS) upon each other have been one of the most thoroughly investigated relationships in the literature. JS is one's affective attachment to the job which can be either viewed in entirety in the form of global satisfaction or with respect to particular aspects that is facet satisfaction for example satisfaction with co-workers, satisfaction with supervisor, etc. Mathieu and Zajac (1990) in their finding from meta-analysis presents a uniformly positive correlation between OC and JS. The components of JS both extrinsic and intrinsic also presented positive correlation though intrinsic satisfaction more strongly correlated with OC than extrinsic satisfaction.

Three main theoretical perspectives are identified by the literature in this area with each having unique conceptual and research implications. The first view suggests a commitment to satisfaction model; that is through a rationalisation process employee's commitment engenders a positive attitude towards his/her job (Ioannidou, Karagiorgos, & Alexandris, 2016) and how one feels about their job which results in the ability to display OCBs. Researchers also posit that commitment developed towards the organisations prior to entry or at least evident at early stages of employment provide support for this perspective (Ünal, 2013). This model also provides support to the view that OC would only indirectly effect OCB through moderators or mediators like JS. This line of argument is supported by multiple studies however there are other studies that negate it.

Contrary to the first perspective researchers are also of the view that JS develops commitment towards the company thus OC acts as a mediator between the effects of JS on OCB. Porter, Steers, Mowday, and Boulian (1974) presented satisfaction-to-

commitment mediation model and argued that OC takes more time in development and is a more stable behavioural construct than JS which has received considerable empirical support in the literature. This perspective suggests that JS has an indirect effect on OCB through OC thus encouraging researchers to evaluate the mechanisms that make satisfied employees more committed to their respective organisations.

The last perspective focuses that both OC and JS independently affects OCB Porter et al. (1974) also presented an independent effect model suggesting that OC and JS though related are independent and unique constructs. This model suggested no certain causality between the two constructs, however, it doesn't rule out the existence of reciprocal influences among them. This perspective most closely relates to the investigation at hand as it calls for research into how attitudes toward the job and company combine and/or interact to influence the ability of employees in displaying OCB These three contrasting views about the relationship of JS and OC towards OCB are based on the theory of sufficiency and provide no common ground about the dynamics of these relationships, therefore this study propose a novel methodology to evaluate these relationships through theory of necessity as whether the OC–JS relationships necessary for relationships between OC and OCB

As the previous meta-analyses shows that research on the mutual relationship between OC, JS, and OCB is very common. In these studies, OC, JS and OCB have been employed in different roles (dependent, independent, moderating, mediating and control) examining the causality among them in terms of sufficiency that is an increase/decrease in the level of a given construct is sufficient to obtain a certain amount of rise/fall in its corresponding construct. Yet there is also another distinct notion of causality concerning with necessity conditions. Traditionally this notion is of the view that a certain or any level for a variable cannot be attained when one or multiple conjectured variables are absent that is No Y (Dependent variable) without X (Conjectured variables). The sufficiency notion of causality focusses on an outcome being produced while the necessary notion emphasises on the existence of an outcome by identifying a necessary clause without which the outcome would not exist, despite the presence of other sufficient factors.

The necessary condition is often presented implicitly in the literature. We come across numerous statements especially in theory development, hypotheses development, study implications or conclusions like X is critical for Y or X is a precondition to Y which could be referred as an alternate formulation of necessary condition. In literature, similar statements can be observed regarding these necessary relationships. Some examples are displayed in Table 1.

The mentioned statements can be interpreted as necessary condition positing that without the presence of OC desired level of certain variables are not possible.

Though in literature, statements regarding necessary conditions are common to date the hypotheses based on necessary condition couldn't be properly tested by traditional data analysis approaches like regression, correlation, etc. The traditional techniques assume that X would sufficiently increase Y, but X is not necessary for Y as it can be increased with the addition of other factors also. Recently to settle this debate between necessity and sufficiency a new analytical technique called necessary condition analysis (NCA) was developed by (Dul, 2016). The NCA enables the researchers

**Table 1.** Examples of Necessary Statements in theory development, hypotheses development, study implications or conclusions sections of articles (emphases not in original; Bold: the assumed causal relationship; Underlined: the determinant X; Italics: the outcome Y).

Source	Sample and Research Design	Theoretical 'necessary statements' in either theory development, hypotheses development, study implications or conclusions
Moorman, Niehoff, and Organ (1993)	870 employees and 205 managers in a national cable television company Structural Equations Modeling	Increases in <u>job satisfaction</u> and <u>organisational commitment</u> resulting from <u>organisational fairness</u> creates a <b>necessity to reciprocate</b> condition in employees leading to the display of <i>organisational citizenship behaviour</i>
Sow (2015)	92 internal auditors in the health care industry in the U.S. Quantitative Techniques	Improving <u>organisational commitment</u> of health care professionals is <b>necessary</b> for organisational outcomes like <i>job satisfaction</i> and <i>organisational citizenship behaviour</i>
Staley, Dastoor, Magner, and Stolp (2003)	1,358 Federal managers Quantitative Techniques	<u>Organisational commitment</u> is <b>necessary</b> for employees' <i>self-management</i> , <i>organisational citizenship behaviour</i> and <i>level of efforts</i> .
Bezzina (2006)	Content analysis	The Maltese case suggests that for a school faculty to <i>develop personally and collegially</i> , individual and <u>organisational commitment</u> is <b>necessary</b> .
Naqvi, Hashmi, Raza, Zeeshan, and Shaikh (2011)	Content analysis	<u>Organisational commitment</u> has a strong effect on the <i>performance and outcomes of the organisation</i> . So we can say that as compared to <i>job satisfaction</i> the <u>organisational commitment</u> is <b>necessary</b> for the organisation.
Flynn (1994)	712 respondents at 42 plants in the U.S., in the electronics, transportation components and machinery industries Quantitative Techniques	In order to support the simultaneous achievement of <i>fast product innovation</i> and <i>high-quality output</i> , a total <u>organisational commitment</u> is <b>necessary</b> .
Hosler and Nadle (2000)	Case study analysis	Developing <u>physician leadership</u> is a core requirement for success for which it is our belief that <i>organisational commitment</i> is <b>necessary</b>
Stenholm, Mathiesen, and Bergsjö (2015)	Case study analysis	<u>Organisational commitment</u> is <b>necessary</b> when <u>adapting the process</u> to a new way of working which is a change both physically and in mindset for all parts.
Helm, Krinner, and Schmalfuß (2014)	Case study analysis	Above all, <i>managerial and organisational commitment</i> is <b>necessary</b> for the implementation of the whole <u>marketing intelligence process</u>
Hausknecht, Hiller, and Vance (2008)	115 work units in a large state agency Quantitative Techniques	Hypothesis development states that "When the level of analysis is the work unit, <i>organisational commitment</i> may be a <b>necessary but insufficient condition</b> for <i>low absenteeism</i> ." Furthermore, their finding shows that "high <i>organisational commitment</i> is <b>necessary</b> to avoid high levels of <i>absenteeism</i> ."
Bowman, Mazerolle, and Dodge (2016)	171 Athletic Training Program Directors Qualitative Techniques	<u>Organisational commitment</u> is <b>necessary and foundational</b> for employee retention.
Palumbo, Sikorski, and Liberty (2013)	Case study analysis	Firm <i>organisational commitment</i> is <b>necessary</b> to enhance participation of nurses in hospital wellness programs.

(continued)

**Table 1.** Continued.

Source	Sample and Research Design	Theoretical 'necessary statements' in either theory development, hypotheses development, study implications or conclusions
Paglis and Green (2002)	150 managers and 450 direct subordinates Quantitative Techniques	'[a] high level of <i>organisational commitment</i> is <b>necessary</b> for managers' efficacy for overcoming obstacles to be translated into leadership action' (p. 231).
Assari, Safi, and Assari (2016)	110 managers, authorities and experts Quantitative Techniques	<i>Organisational commitment</i> is <b>necessary</b> to improve the process of <b>knowledge sharing</b> in the organisations.
Al Jerjawi (2016)	Content analysis	Consequently, whether an organisation employs expatriates or nationals, a performance management strategy that seeks to <i>motivate, increase employee satisfaction, and/or ensure organisational commitment</i> is <b>necessary</b> for amplified <b>performance</b> .
Güleç and Samancı (2018)	Meta-analysis	<i>Job satisfaction and organisational commitment</i> are <b>necessary</b> to <b>performance</b> .
Pettijohn, Pettijohn, and Taylor (2002)	109 retail salespeople Quantitative Techniques	Thus, the findings lend support for Hypotheses 1 and 2. It seems that both organisational commitment and job satisfaction are necessary requisites for customer orientation.

to test necessary condition-based hypotheses. NCA has been developed to identify necessary conditions, unlike traditional data analysis techniques like regression which identify sufficient conditions. Increasing the sufficiency condition as identified by regression would not increase the level of outcome, as the outcome cannot exist if the necessary conditions are not satisfied. The NCA method can be applied to any branch of organisational research in which the theory supports necessary statement which are common in strategy, organisational behaviour, human resource management. There are also studies that have applied NCA in the fields of operational management, business theory, political science, medicine and technical science. This article applies NCA on data collected from two meta-analyses on the relationship of OC with JS and OCB. By applying NCA methods on data collected through systematic reviews rather than primary data, the study offers an additional logic and data analysis methodology for a finer-grained understanding of the relationship between OC, JS, and OCB in specific and thus making a valuable methodological contribution in general. Most importantly this study subjects the widely researched relationships between OC, JS, and OCB to notion of necessity and fundamentally change the way we view the relationships between the variable. This enables NCA to have strong managerial implications. The managers could not attain the desired outcomes unless they have placed every single condition at an optimum level required. The substantive research question addressed in the study for testing meta-analytical NCA is: whether the relationships between OC and JS necessary for the relationships between OC and OCB?

## 2. Method

Methodically this is a three-wave study. In the first two waves, Meta-analyses were conducted to systematically review the literature for evidence that links OC to JS and OCB. Furthermore, evidence obtained through the systematic review were subjected to a series of meta-analyses to obtain combined estimates regarding the strengths of these statistical relationships using 'Comprehensive Meta-Analysis' (CMA) software. Once the relationship between OC with JS and OCB are meta-analysed and the strengths of these relationships established through random effects models and tests for heterogeneity, the Fisher z scores generated through CMA were subjected to 'Necessary condition analysis' (NCA) software developed by Dul (2016) to detect the necessity of OC–JS relationship, for the OC–OCB relationship.

### 2.1. Literature search

For this study, an extensive literature search was conducted to identify published and unpublished reports that evaluated the mutual relationship of OC with JS and OCB. In the first step, the sources were identified through a general electronic search in Google scholar with keywords OC, JS and OCB in the form of exact terms appearing anywhere in the sources. However, the general search with these setting generated unlimited results. Thus, the search settings were modified and limited to the concurrent occurrence of keywords commitment, satisfaction, and citizenship in the title of the sources resulting in 243 sources. In the second step major, electronic search databases Elsevier (Science Direct), JSTOR, Springerlink, Taylor & Francis Journals, Wiley-Blackwell Journals, Emerald, Institute for Operations Research and The Management Sciences (Informs) and ISI Web of Knowledge (For Reference Searching) were used. The search settings for these databases were the concurrent occurrence of keywords commitment, satisfaction, and citizenship in either title, abstract and keywords of the sources. The search results from each database were compared with the initial electronic search in Google scholar to remove repetition resulting in 34 unique sources. To supplement this electronic search a manual search of reference lists of key empirical and theoretical articles, book chapters on OC, JS and OCB and previous meta-analysis was also conducted and compared with the previous two electronic searches resulting in 10 unique sources.

### 2.2. Inclusion criteria

The sources obtained from the three-step electronic and manual search were reviewed for appropriateness of content and considered for inclusion in the two meta-analyses. Initially, abstracts or introduction of the sources were evaluated and studies which did not have data and did not examine the concurrent relationship of OC with JS and OCB were excluded. Based on this review 101 studies were selected for further considerations. The authors read these studies to determine whether these studies should be included in the meta-analyses based on two decision rules. First, the study should investigate the relationship of OC with both JS and OCB in the same study setting, sample and report a Pearson-r value for OC–JS, as well as OC–OCB

relationship. Second, the sources fulfill methodological rigour 10 criteria developed by Faragher, Cass, and Cooper (2005) for organisational psychology research which are as follows:

1. Representative Sample
2. Sample stratified for gender, age, level of seniority, ethnic origin, or degree level
3. Summary statistics for gender, degree level, occupation, industry, country, age
4. Response rate adequate
5. Sample size acceptable
6. Smartphone Addiction and Behavioural outcome measures acceptable (that is, validated, reliable, internally consistent and either continuous or ordinal)
7. Useable effect size statistic(s) reported (or obtainable from authors)
8. Statistical analysis of study findings appropriate
9. Adjustments made for important confounding factors
10. Attrition rate adequate (if longitudinal design used).

Each study was rated according to these criteria (0 = unacceptable; 1 = acceptable) and a summated 'rigour' score was computed (range 0–10). Studies having rigour rating more than 6 were retained for analysis.

Keeping in consideration the inclusion criteria seventy studies, which included 70 independent samples, fulfilled the requirements providing 140 correlations of OC with JS and OCB with the combined population of 21,628 according to the flow diagram shown in [Figure 1](#). To evaluate the degree to which the research team provided consistent methodological rigour estimates for the studies, the intraclass correlation coefficient was calculated which was 0.752 (LBCI = 0.614, UBCI = 0.821) with  $p < 0.001$  displaying acceptable inter-rater reliability.

### **2.3. Meta-analysis procedures**

Two meta-analyses were conducted using the Hunter–Schmidt psychometric meta-analysis method (Hunter & Schmidt, 1990). Each study included in the meta-analyses would investigate the relationship of OC with both JS and OCB in similar study setting and sample. Seventy studies, which included 70 independent samples meet the inclusion criteria for each meta-analysis providing 70 correlations between OC with JS and 70 between OC with OCB. The correlation reported from individual samples were also corrected for measurement error by employing Hunter and Schmidt correction formula that is adjusting the correlations for the reliability of measure where reported and otherwise using norm value of reliability from published material.

The corrected correlation values for each meta-analysis were analyzed through meta-analysis software 'Comprehensive Meta-analysis.' The first results provided were the fixed and random effects. The difference between fixed effects model and random effects model is that the fixed model assumes all the studies having a same true underlying effect and any variation that is observed from study to study is just due to sampling error. This model asserts that as all the studies are estimating the same quantity then more weight should be given to studies that provide more information



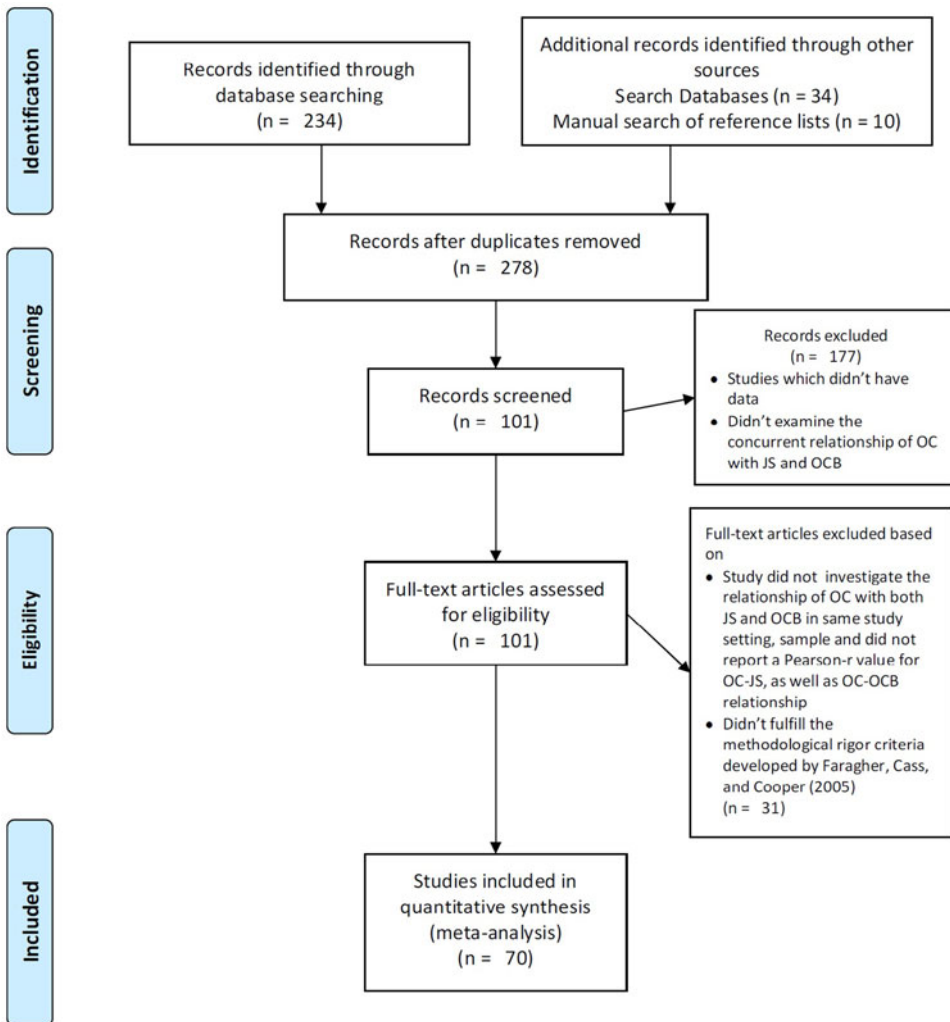


Figure 1. Flow diagram.

about that quantity. In contrast, the random effect model doesn't make this assumption. It allows for the probability that the true effects underlying each study could be different thus providing an estimate which is the mean effects across all studies. The level of imperfection that we observe in a study is not only due sampling error for the estimate (e.g., correlation) but also due to the fact that this particular study is random and one study among any number of studies that could have been done. For this study, a random effects model was used as it estimated the mean of any number of true effects of an infinite sample size for each study. These effects that were not be same and there would be some dispersion among them because the true effect in each study is different. To evaluate the level of dispersion among the reported results of the studies, heterogeneity of the effect sizes is also presented. Q statistic and I-squared help us decide about the level of heterogeneity in our studies while  $\tau$  (tau)

presents the variance of dispersion and  $\tau^2$  (tau-squared) presents the standard deviation of dispersion.

#### **2.4. Necessity condition analysis**

NCA would be applied to the Fisher z scores generated from the two meta-analyses. Dul (2016) is one of the pioneers in developing the NCA techniques. The NCA technique generates scatterplots between variables, set of variables or relationships to investigate the existence of necessary condition between them. An empty upper left corner called the ceiling zone separated from the lower right section by ceiling lines in the scatterplots suggests the presence of the necessary condition. These ceiling lines identify the level of the necessary factor (X) required for any given level of outcome (Y). There are different techniques for drawing ceiling lines each maximising the ceiling zone by assuming a non-decreasing (piecewise) linear ceilings with limited or no observation in the ceiling zone. The ceiling zone, ceiling lines, and accuracy statistics are calculated by the NCA software.

Once the existence of the necessary condition is established, the level of a necessary condition is evaluated by the effect size. In NCA effect size refers to the level of constraint ceiling poses on the outcome. The effect size (d) is the size of the ceiling zone in relation to the total space in which observations are empirically observed. Larger the ceiling zone larger would be the effect size. Dul (2016) presents a rule of thumb for evaluating the effect size which is as follow: 0 to 0.1 is small effect size, 0.1 to 0.3 is medium effect size, 0.3 to 0.5 is large effect size and greater than 0.5 is very large effect size. Effect size is a general measure displaying the level of constrain the constrainer X extends on the constraineed Y. However normally not all values of X constrain Y and for not all values of Y, Y is constrained by X. NCA calls this phenomenon as inefficiency and presents its two components condition inefficiency and outcome inefficiency. condition inefficiency specifies the level of X not needed for even the highest level of Y. While outcome inefficiency indicates that for a level of Y, any level of X allows for a higher value of the Y. The Inefficiencies are inversely proportional to effect size i.e., larger the inefficiencies smaller would be the effect size. In the absence of both Inefficiencies, the effect size would be 0.5. Furthermore, if any one of the inefficiencies is 100% results in no ceiling and consequently no necessary condition and zero effect size. Lastly, the angle of the ceiling line also depends upon the condition and outcome inefficiencies. If both the Inefficiencies are equal the angle of the ceiling line would be 45 degrees. If the condition inefficiency is larger than the outcome Inefficiency that the ceiling line would be steeper, i.e.,  $> 45$  degrees. On the contrary, if the larger outcome inefficiency than condition inefficiency results in ceiling line  $> 45$  degrees thus less steep.

### **3. Results**

The following studies shown in Table 2 were chosen based on the inclusion criteria of the systematic review.

**Table 2.** Studies chosen for meta-analyses.

	Study	Sample	Type
1	Donavan, Brown, and Mowen (2004)	156	Journal
2	Williams and Anderson (1991)	127	Thesis
3	Yi, Natarajan, and Gong (2011)	505	Journal
4	Moorman, Niehoff, and Organ (1993)	170	Journal
5	Kuehn and Al-Busaidi (2002)	153	Journal
6	Nguni, Slegers, and Denessen (2006)	545	Journal
7	Schappe (1998)	130	Journal
8	Ensher, Grant-Vallone, and Donaldson (2001)	366	Journal
9	Foote and Li-Ping Tang (2008)	242	Journal
10	Zeinabadi (2010)	783	Journal
11	Parnell and 'Rick' Crandall (2003)	114	Journal
12	Rifai (2005)	383	Journal
13	Zeinabadi and Salehi (2011)	783	Journal
14	Salehi and Gholtash (2011)	341	Journal
15	Najafi, Noruzy, Azar, Nazari-Shirkouhi, and Dalvand (2011)	378	Journal
16	Lowery, Beadles, and Krilowicz (2002)	91	Journal
17	Felfe and Heinitz (2010)	260	Journal
18	Ertürk, Yilmaz, and Ceylan (2004)	107	Journal
19	Jahangir, Akbar, and Begum (2006)	195	Journal
20	Ünüvar (2006)	300	Thesis
21	Sesen and Basim (2012)	275	Journal
22	Maharaj and Schlechter (2007)	102	Journal
23	Rubin and Brody (2011)	2131	Journal
24	Yates (2011)	230	Journal
25	Barzoki and Ghujali (2013)	175	Journal
26	Nwibere (2014)	210	Journal
27	Mogotsi (2010)	283	Thesis
28	Uludağ, Khan, and Güden (2011)	116	Journal
29	Küçükbayrak (2010)	137	Thesis
30	Yahaya, Yahaya, Maalip, Ramli, and MdKamal (2012)	140	Journal
31	Kopp (2013)	125	Thesis
32	Tharikh, Ying, and Saad (2016)	200	Journal
33	Chhabra and Mohanty (2014)	449	Journal
34	Rhee, Yang, and Kim (2011)	380	Journal
35	Jenaabadi, Okati, and Sarhadi (2013)	480	Journal
36	Öztürk (2010)	225	Thesis
37	Chiu, Kwag, and Bae (2015)	170	Journal
38	Lin and Chang (2015)	386	Journal
39	ten Hoor (2014)	260	Thesis
40	Holsblat (2014)	314	Journal
41	Maharaj (2006)	102	Thesis
42	Ioannidou, Karagiorgos, and Alexandris (2016)	817	Journal
43	Ariani (2014)	415	Journal
44	Prasetio et al. (2017b)	277	Journal
45	Rezaiean, Givi, Givi, and Nasrabadi (2010)	129	Thesis
46	Pivi and Hassan (2015)	100	Thesis
47	Fareed, Hassan, and Hayat (2016)	300	Journal
48	Kahumuza (2008)	187	Thesis
49	Saif-Ud-Din and Adeel (2016)	140	Journal
50	Seo (2012)	296	Thesis
51	Radebe and Dhurup (2016)	219	Thesis
52	Middleton (2008)	192	Thesis
53	Prasetio et al. (2017a)	320	Journal
54	Khajepour, Baharlou, Yeganeh, and Hashemi (2016)	232	Journal
55	Motaung (2016)	250	Thesis
56	Farndale, Beijer, Van Veldhoven, Kelliher, and Hope-Hailey (2014)	298	Journal
57	Bilgin, Kuzey, Torlak, and Uyar (2015)	768	Journal
58	Teh and Sun (2012)	116	Journal
59	Gürbüz, Şahin, and Köksal (2014)	200	Journal
60	Kim, Park, and Chang (2011)	196	Journal
61	Cloninger, Selvarajan, Singh, and Huang (2015)	435	Journal

*(continued)*

**Table 2.** Continued.

	Study	Sample	Type
62	Li (2013)	493	Journal
63	Beasley and Jason (2015)	306	Journal
64	Ruiz-Palomino, Ruiz-Amaya, and Knörr (2011)	525	Journal
65	Kim, Shin, and Kim (2013)	261	Journal
66	Choi et al. (2017)	236	Journal
67	Yao and Wang (2008)	250	Journal
68	Daly, DuBose, Owyar-Hosseini, Baik, and Stark (2015)	319	Journal
69	Kickul, Lester, and Belgio (2004)	136	Journal
70	Potipiroon and Rubin (2016)	196	Journal
	Total Sample	21628	

Evidence obtained through the above systematic review is subjected to a series of meta-analyses to obtain combined estimates and their strength. In the first meta-analysis Correlation values between OC with JS are subjected to meta-analytical statistics test the combined strength and test for heterogeneity of these effect sizes. The results of these tests are as follows:

The expected result was that the increase in OC would be associated with improved JS In Table 3 the overall combined studies relationship found between OC and JS was positive with  $\bar{r}=0.546$  (LL = 0.490 & UL = 0.510,  $Z=18.336$ ,  $p<0.001$ ) thus confirming that the effect size cannot be zero. Next, the Table 3 also provides information about the heterogeneity of effect size. Q statistic for this meta-analysis is 1711.49 significant at  $p<0.001$  exhibiting that effect size from each study is significantly heterogeneous.  $I^2 = 95.852$  describes the proportion of observed variance reflects real differences in the studies. Lastly,  $\tau=0.275$  reflects the dispersion of the fixed effects and  $\tau^2=0.076$  is the standard deviation of this dispersion. In summary, the meta-analysis shows that there exists a positive and significant association between OC and JS, however, the results reported by these studies are significantly heterogeneous.

In the second meta-analysis correlation values between OC with OCB were also subjected to similar meta-analytical statistics to evaluate the combined strength and test for heterogeneity. The results of these tests are as follows:

Similar to the first meta-analysis a positive relationship between OC and OCB was expected. Table 4 shows that the relationship between OC and JS was positive with  $\bar{r}=0.374$  (LL = 0.33 & UL = 0.416,  $Z=15.305$ ,  $p<0.001$ ) thus confirming the significance of the relationship. Heterogeneity of effect size was confirmed by Q statistic = 1000.77 ( $p<0.001$ ),  $I^2 = 92.905$  of observed variance reflects real differences in the studies, while dispersion of the fixed effects  $\tau=0.207$  and standard deviation  $\tau^2 = 0.0429$ . Similar to the first wave of meta-analysis there exists a positive and significant relationship between OC and OCB; however, the results reported by these studies are significantly heterogeneous. The purpose of these meta-analyses is to advocate that sufficiency notion of causality doesn't clearly state the requirements of one form of relationship for another. From these meta-analyses, we gain significant positive effects of OC with JS and OCB, yet we also confirm from the same analysis that the effects of these studies are significantly heterogeneous with  $I^2$  for both the meta-analyses larger than the arbitrary proportion of 25%. To overcome this conundrum of

**Table 3.** Meta-analytical statistics for organisational commitment and job satisfaction.

Model	No	Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				$\tau^2$			
		$\bar{r}$	LL	UL	Z	p	Q	df (Q)	p	$I^2$	$\tau^2$	Standard Error	Var	$\tau$
Fixed	70	0.500	0.490	0.510	81.984	<0.001	1711.49	69	<0.001	95.852	0.076	0.0171	0.000291	0.275
Random effects	70	0.546	0.498	0.590	18.336	<0.001								

**Table 4.** Meta-analytical statistics for organisational commitment and organisational citizenship behaviour.

Model	No	Effect size and 95% interval			Test of null (2-Tail)		Heterogeneity				$\tau^2$			
		$\bar{r}$	LL	UL	Z	p	Q	df (Q)	p	$I^2$	$\tau^2$	Standard Error	Var	$\tau$
Fixed	70	0.361	0.350	0.373	56.449	< 0.001	1000.77	69	< 0.001	92.905	0.0429	0.009850	0.000097	0.207
Random effects	70	0.374	0.330	0.416	15.305	< 0.001								

significant yet heterogenous relationship based on the sufficiency theory between the study variables, NCA analysis was employed to test the necessity of OC–JS relationships for OC–OCB relationships.

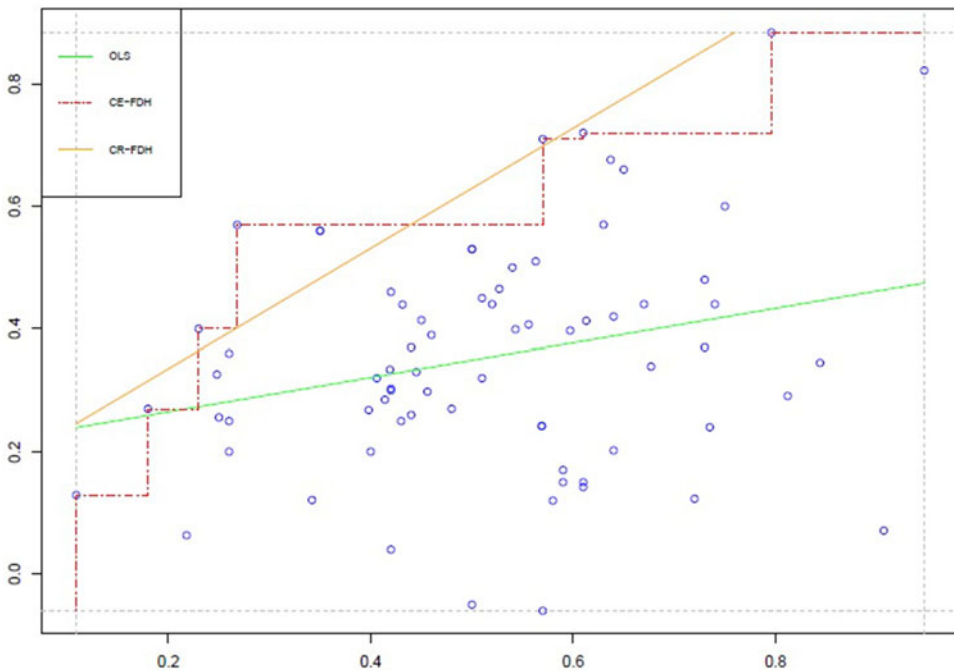
The data generated from the meta-analyses was analyzed through NCA package. The first output that the package generated was scatterplot (Figure 2) between the reported effects of OC on JS and OC on OCB

The plot suggests a possible presence of necessary condition as there is empty space in its upper left corner. Two ceiling lines CR-FDH and CE-FDH can be observed in the scatterplots. For data analysis and interpretation, this study would be using CR-FDH. There are three main reasons, first CR-FDH is based on CE-FDH thus it has fewer limitations than CE-FDH. Second CR-FDH is the default technique for parametric data and lastly, this technique is less sensitive to outliers and measurement errors.

The NCA statistics generated by the package are shown in Table 5.

The first statistics that the NCA analysis generates is the accuracy which is the number of observation/s above the ceiling line. For this study, the value is 93.1% displaying high accuracy thus illustrating the existence of the necessary condition. Second ceiling zone = 0.208 and ceiling scope = 0.981 is generated through CR-FDH technique, quantifying the empty space at the top left corner of the scatterplot and the total area below the ceiling line where empirically observed responses are present respectively, consequently satisfying the assumption of existence of necessary condition through statistics rather than visual observation of the scatterplot.

Based on the calculated CR-FDH ceiling zone and ceiling scope the effect size (level of constraint ceiling poses on the outcome) is generated which is the ceiling zone divided by the scope. Dul (2016) presents a rule of thumb for the analysis of the magnitude of effect size. Based on the guideline 0 to 0.1 is small effect, 0.1 to 0.3 is medium effect size, 0.3 to 0.5 is large effect size and > 0.5 is considered very large effect size. Unlike the traditional sufficiency notion in NCA small effect sizes are



**Figure 2.** NCA scatterplot between OC-JS and OC-OCB relationships.

**Table 5.** NCA statistics.

Method	CE – FDH	CR – FDH
Accuracy	100%	93.10%
Ceiling Zone	0.235	0.208
Scope	0.981	0.981
Effect size (d)	0.297	0.262
Condition Inefficiency	18.019%	22.373%
Outcome Inefficiency	20.021%	32.393%

highly meaningful as they still imply that a particular necessary condition must be present for the outcome to exist. For this study the effect size = 0.262 which according to the rule of thumb is medium effect size.

In Table 5 both condition inefficiency and outcome inefficiency are also reported. The condition inefficiency is 22.373%, denoting that above 77.627% of the overall combined studies relationship found between OC and JS is not necessary for even the highest level of the relationship found between OC and OCB. The outcome inefficiency reported in Table 5 is 32.393%. It demonstrates that for the desired level of relationship found between OC and OCB that is below 32.393% of 0.884 (the maximum level of relationship found between OC and OCB) = 0.286, the relationship between OC and JS is not a necessary condition for the relationship between OC and OCB.

Lastly, in Table 6 NCA produces a 'bottleneck table', which presents an OC-JS level of relationship thresholds that are necessary for attaining a certain desired level of OC-OCB relation. For this study, the desired OC-OCB level of the relationship

**Table 6.** NCA Bottleneck table.

Desired level of OC–OCB relation	OC–JS level of relationship thresholds
0	NN
10	NN
20	NN
30	NN
40	8.7
50	20.2
60	31.7
70	43.2
80	54.7
90	66.1
100	77.6

was divided into three sets low (0 to 30%), medium (30% < and  $\leq$  60%) and high (60% < and  $\leq$  100%).

For low level of OC–OCB desired relation, the OC–JS relationship is not necessary which is also confirmed by outcome inefficiency of 32.393%. For attaining of medium level OC–OCB desired relation (>32.393%), OC–JS relationship becomes a necessary condition. Lastly, for the highest level of desired OC–OCB relationship, OC–JS relationship becomes necessary condition up to 77.6% of its level, while the remaining 22.373% refers to condition inefficiency.

#### 4. Discussion

The purpose of this study was to subject a widely researched and meta-analysed relationships between OC, JS, and OCB to the notion of necessity to answer the substantive research question developed for this study that is: whether the relationships between OC and JS are necessary for the relationships between OC and OCB? As mentioned earlier the literature presents three causal relationships between these constructs, i.e., OC–JS model, a JS–OC model, and OC and JS though related yet independent and unique constructs model for the display of OCB. To test all these relationships, we conducted two meta-analyses. In the first meta-analysis, a positive and significant OC–JS (or JS–OC) relationship was established. However, the heterogeneity test reported significant differences among the reported effects of the studies. Similar results were obtained from the OC–OCB meta-analyses confirming a significant positive relationship as reported by previous studies and meta-analyses, yet the heterogeneity test presented significant differences among the reported effects of the studies. The meta-analytical procedures have been used by the researchers to provide reliable and valid input on possible causality among constructs. However, in the study at hand after two meta-analyses, the causal relationships between these three most commonly used constructs couldn't clarify the necessity of OC–JS relationship for OC–OCB relation. We proposed that this elucidation could be made through the notion of necessity, rather sufficiency by further employing NCA on data generated through two meta-analyses to prove the necessity of one relationship for another. Traditionally NCA has been applied to variables or set of variables. However, we applied it to, two sets of relationships to examine one's necessity for the other. The results showed that the OC–JS relationship is necessary for OC–OCB relationship

thus answering the study research question. These results encompass all three perspectives presented by the literature about the OC and JS relationship for the display of OCB. The results confirm the relationship of OC and JS, irrespective of whether its OC–JS relationship or JS–OC relationship, is necessary for medium to high level of OC–OCB relationship. Furthermore, the results also presented outcome inefficiency of 32.4% which means that for a lower level of OC–OCB relationship JS through related to OC can act as an independent and unique construct. Meta-analysis is used with an assumption that the utility of an intervention or the validity of the hypothesis cannot be based on the results of a single study as the results may vary from one study to the next. Traditional meta-analysis provides us with a mechanism to synthesise this data across studies. However, heterogeneity among the studies makes it difficult in drawing overall conclusions like in the study at hand (Higgins & Thompson, 2002). By employing NCA on meta-analytical data an effort has been made to overcome this difficulty. Our result suggests that irrespective of level of heterogeneity we can decide on necessity-based hypotheses or research questions. The results of this study though heterogenous infer that the OC–JS relationships are necessary for OC–OCB relationships. By using OC–JS and OC–OCB relationships as a test case the results of this study enable us to decide on multiple perspective in the literature about relationships among variables.

## 5. Strengths, limitations, and future studies

This study combines two analytical techniques in a complementary manner. The CMA conducted the meta-analyses for the study and based on the results of CMA the data was analysed through the NCA condition analysis. There are numerous studies from different fields of sciences and social sciences that have used meta-analysis for determining the necessity of variable(s) one another based on the notion of sufficiency. As NCA now enables us to test hypotheses based on the notion of necessity, it is therefore recommended for future scholars and researcher to combine these two analytical techniques to perform meta-analysis that examines the necessity of one variable for another.

This study also has some limitation. The first limitation of this study is the lack of potential mediators and moderator. From the literature, it can be observed that the relationships between the study variables have been subjected to mediation and moderation to evaluate the dynamics of their relationships. Until now, the NCA methodology has not had the ability to assess the effects of possible mediators or moderators. This article to some extent addresses this limitation by comparing the necessity of one relationship for another; rather than the necessity of one variable for another. However future researchers should consider this limitation when deciding upon the causality among variables. Second, like other data analysis techniques NCA also presumes that the scores generated for the variables are valid and reliable however its results may be flawed when there is measurement error. For this study, we have tried to address the measurement error issue by employing the Hunter and Schmidt (1990) correction formula. Still for making a causal inference based on NCA (like other analytical techniques) scholars must rely on a solid theory that makes



necessity-based causality between the main concepts of the study plausible. Another important limitation of NCA that it doesn't share with other statistical techniques is that it's a new technique. For example, regression analysis is more than 100-years-old while the research on NCA statistical properties for estimating ceiling lines and estimation of confidence intervals has just been started, while this study has further proposed a novel dataset which has never been subjected to NCA Up until recently, NCA hasn't addressed all issues regarding statistical inference and causality. Hence it is suggested for future researchers that caution is needed when drawing causal conclusions based on the NCA method in general and this study's methodology in specific unless backed up by a strong theoretical base as presented in this study. Although meta-analytical NCA technique needs further exploration and development, the logic of this technique is well developed and provides a fundamentally different view of the application of NCA on meta-analytical data, one which complements traditional meta-analytical perspectives and provides valuable theoretical and practical insights about the relationships between variables.

The meta-analytical NCA could discover relationships under the lens of necessity for attaining other relationships. It has the capability for being a useful addition to the current meta-analytical toolkit. This methodology is a complement, not a replacement, of traditional approaches to analyse causal relations. NCA may provide new insights that are normally not discovered with traditional approaches. Furthermore, studying relationship's necessity, based on meta-analysis data advances a fundamentally different understanding about the dynamics of casual relationships and its outcome relationships: a causal relationship is necessary for an outcome relationship to exist; conversely, if the necessity relationship is not in place at an optimum level, the outcome relationship would not exist. Both scholars and practitioners will be more effective and efficient if they focus on necessary relationships rather than diverging their energies and resources on factors that partially affect the outcomes.

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