Meta-analysis of the Factors Influencing the Employees' Creative Performance

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Abstract. Innovation has become a popular topic in society. The creative performance fluctuates with the employees' mood caused by the working environment. Many factors have been suggested to be affecting the employees' creative performance. The paper answered the questions as "What are the factors that affect the employees' creative performance through employee behavior? What is the proportion (weight) of each of these determinants?" Furthermore, this study resolves this problem via the meta-analysis, which refers to do systematic quantitative analysis by former studies to summarize the research results of creative performance over the last ten years, and to ascertain the factors influencing the creative performance as well as to determine the correlation between them. Suggestion having been proposed including the further investigation of the interaction between the factors impacting the employees' creative performance as well as explore the corresponding effects. And it is necessary to note that changing one factor may eliminate the effect of several factors, which may cause negative change in the staff creative performance and there is joint efforts needed in terms of enhancing the employees' creative performance.

Keywords: Factors · Creative performance · Meta-analysis

1 Introduction

Creative performance refers to the products, processes, methods, and ideas created by the employees, which are novel, practical, and valuable to an organization. Although creativity varying from person to person cannot be generalized, it is not fixed. In other words, creativity is constantly fluctuating. Likewise, the creative performance fluctuates with the employees' mood caused by the working environment. What are the factors affecting the employees' creative performance? Do they have positive or negative impacts on the staff? Which of these factors has more profound influence and which has less? These issues are

considered by both business managers and numerous scholars. By surveying past scholarship on creative performance, the paper finds that there are similarities and differences between the researches. Specifically, some examine the impact of internal factors on the employees' creative performance; some explore the external factors; some investigate the employees' creative performance affected by both internal and external determinants, while others study several other influencing factors. All these researches, however, are not comprehensive. What are the factors that affect the employees' creative performance through employee behavior? What is the proportion (weight) of each of these determinants? The paper resolves this problem via the meta-analysis, hoping to summarize the research results of creative performance over the last ten years, and to ascertain the factors influencing the creative performance as well as to determine the correlation between them.

1.1   Related Concepts

Creative performance refers to the products, processes, methods and ideas created by the employees, which are novel, practical, and valuable to an organization. Work passion, a core characteristic of self-identification, refers an employee's strong love for a certain occupation, which he or she considers vital and into which this individual tends to invest time and effort.

Autonomous orientation refers to an individual's desire to act, based on his or her interests and self-values. More precisely, this individual considers incidents as opportunities and challenges, and he or she will take active actions to seize these opportunities and to shoulder the responsibilities, showing strong internal and extrinsic motivations.

Control orientation refers to an individual's desire to act, based on other individuals' attitudes rather than his or her own ideas, because he or she is vulnerable to the external environment.

Mastery approach goal orientation refers to the development process in which an individual tends to concentrate on the abilities, learning, and tasks. Performance approach goal orientation refers to an individual's emphasis of the performance-related matters.

Performance avoidance goal orientation refers to an individual's avoidance of the performance-related matters.

Cognitive re-evaluation refers to an individual's control of the emotional response through changing the impact of events on personal awareness.

Inhibition of expression refers to an individual's control of the emotional response by suppressing the emotional expression.

Feedback consistency refers to the consistency between an employee's expectation of the boss's feedback on his or her work performance and the actual feedback this individual receives.

1.2   Literature Review

(1) Overview of Foreign Researches

As early as the 20th century, the academic circle started researching on the creativity and creative performance. Analyzing the impact of leadership style and support on the employees' creative performance through empirical studies, Huang et al. [4], argued that charismatic and supportive leaders will facilitate the creative performance. Based on the investigation of the relationship between the employers and the employees, their research results provide references for the managers. The above researchers, however, do not consider the impacts of the employees' personal factors on the creative performance. Ulger [7] examined the impact of employees' participation in the creative processes and the pleasure and challenge of creative tasks on their creative performance through empirical researches. They claim that the more staff participation and the more intriguing and challenging the task, the better the creative performance will be. Moreover, the time of the staff participation process, during which multiple factors may contribute to the change of staff creativity, will determine the level of the final creative performance. Nevertheless, these scholars leave the second point for future research. Chong and Ma [1] explored the influence of the personal factors of employees, such as motivation, mood and demand, on the creative performance via empirical researches, he suggest that the motivations and demands of employees generally have positive impacts on their creative performance. Furthermore, in terms of mood, the negative emotions have an adverse effect on their creative performance and vice versa. Their researches assist readers to understand what affects the employees' creative performance from the internal perspective, but they fail to consider the external factor.

(2) Overview of Domestic Researches

Likewise, being interested in this topic, Chinese researchers conduct a host of studies. Using the empirical research, Zhang [8], Zhang et al. [9], Zhang et al. [10], Tang et al. [6], examine the impacts of organizational environment (for instance, working time and pressure, organizational situation, and leadership) on the employees' creative performance. They conclude that the staff creativity is positively correlated with the working time and pressure as well as leadership styles; the influence of organizational situations varies from person to person. Song [5], Zhang et al. [9], Dong et al. [2], analyzing the impacts of the employees' emotions on their creative performance, concur that the negative emotions have adverse impacts on creative performance, and vice versa. Due to other factors in these studies, their research data differ moderately. Similar to foreign scholars, the above researchers only investigate one aspect that affects the staff creativity. Gong et al. [3], exploring the influence of employees' motivations on their creative performance via the empirical research and scenario analysis, ascertain that the creative performance is inhibited by the workers' extrinsic motivations and control motivations but promoted by the employees' other motives. Their final results differ because of various classifications of the motivations.

Overall, Chinese and foreign scholars have investigated numerous factors affecting the creative performance, and their conclusions, which differ slightly

in each essay, are roughly the same. In terms of research methods, these papers, however, principally adopt empirical research and scenario simulation. As for the investigations of the influencing factors, they largely highlight one of them. Based on the literature above, this paper utilizes a different approach– the meta-analysis, seeking to examine the factors that impact the employees' creative performance holistically.

1.3 Introduction to the Meta-analysis

(1) Definition and Characteristics of the Meta-analysis

The Meta-analysis is widely used in disciplines, such as medicine, psychology, economics, and management. In these fields, numerous scholars, for the most part, study the same problem, but the final results may be different due to the process control, error, and sample selections. Therefore, they fail to reach a clear conclusion. It is of necessity and significance to analyze the results achieved by other scholars through the Meta-analysis.

Meta-analysis was first proposed by American scholar Glass when he gave a speech at the American Educational Research Association in 1976. According to Glass, meta-analysis refers to a statistical analysis that combines the results of multiple individual studied to resolve uncertainty when reports disagree.

Nonetheless, there is no unified definition of the Meta-analysis. This paper adopts the definition from the book titled Conducting Meta-Analysis through Stata: Meta-analysis is a statistical approach that examines the results of the individual studies of the same topic, analyzing the similarities and the sources of difference between these research outcomes. Meta-analysis and systematic evaluation are different concepts, even though there are similarities between them. Systematic evaluation refers to a rigorous evaluation and review of an issue via a certain search strategy, in the process of which the Meta-analysis may or may not be used.

There are some salient features (advantages) of the Meta-analysis, compared with the individual study: (i) to improve the statistical efficacy; (ii) to evaluate the results quantitatively and comprehensively, resolving uncertainty when reports disagree; (iii) to evaluate the hypothesis, discovering the deficiencies of the previous researches; (iv) to analyze numerous literature data simultaneously, without being affected by the number of references; (v) Using the individual research results as the original data, Meta-analysis is a higher level of logical analysis.

(2) Advantages and Disadvantages of the Meta-analysis

Each research method has its advantages and limitations, and the paper presents a brief introduction to the merits and demerits of the Meta-analysis.

The Meta-analysis is used extensively because of four advantages. First, the Meta-analysis is more accurate than the significance test in terms of the estimation and reliability analysis of the effect values. Second, the scholars may discover the shortcomings of the individual researches via the Meta-analysis, thereby avoiding the flaws. Third, the results of individual studies are aggregated

through the Meta-analysis; hence, more objective explanations are conducted, and more reliable and accurate conclusions are researched. Fourth, new research directions and suggestions will be put forward after the Meta-analysis, which will provide references for further researches.

Nevertheless, like other methods, there are some flaws in the Meta-analysis. First, it takes a long period of time to conduct the Meta-analysis, due to its requirement for a large amount of literature. Thus, the workload is heavy. Second, it is difficult to find all the literature on a particular issue; hence, researchers cannot conduct a comprehensive statistical analysis. Last, it is difficult to ensure that the thinking and structure of the existing studies are consistent, that the qualities of these essays are high, and that the data is complete. Therefore, not all the documents are useful, and the amount of the literature may vary significantly among different research groups.

2   Research Method

2.1   Literature Retrieval

Although creative performance is a relatively new topic, scholars at home and around the world have conducted numerous researches. The paper firstly utilizes the keyword retrieval, the main method of literature retrieval, to search articles on the creative performance, employee behavior, and the factors affecting the employees' creative performance. Secondly, according to the references of the retrieved essays, the paper searches the related documents in each database, including the doctoral dissertations and journal articles published after 2010. The literature retrieval is conducted at the library of Sichuan University. Both Chinese databases (such as the CNKI, Wan) and foreign databases (for instance, Science-Direct, and Springer Link) are used in this research paper. Manual search is not required, since electronic magazines are available in the information age, and the databases above provide all the materials needed in this study.

2.2   Inclusion and Exclusion Criteria for Literature

(1) Literature Inclusion Criteria

First, the literature should be published or unpublished between 2000 to 2015.

Second, the literature should be associated with creative performance.

Third, the data should be relatively complete, including the values of correlation coefficients, such as T, F, and P. The articles may not contain all these data, but they should provide sufficient figures that are needed in this research.

Fourth, the research object should be explicit, describing the sample size, age, and gender.

Fifth, the factors for creative performance should be quantitatively determined.

Sixth, the questions listed in the scales should be expressed clearly.

Table 1. An overview of the selected literature

Number	Author	Year	Influencing factor	Research object	Effective sample size
1	Zhang Jian et al.	2013	The employees' emotions, orientations, etc.	Employees	222
2	Zhang Jian et al.	2013	Time pressure, creative personality, etc.	Freshmen	60
3	Dong Li et al.	2012	The employees' emotions, orientations, etc.	Freshmen	273
4	Zhang Jian et al.	2010	Independent motivation, control motivation, etc.	Employees	150
5	Tang ChaoYing et al.	2012	Leadership style, team recognition, etc.	Researchers	209
6	Song Yahui et al.	2015	Passion for work	Employees	162
7	Gong Zhenxing et al.	2015	Feedback, goal and personality, etc.	Employees	159
8	Wang Haocheng et al.	2013	Time pressure	College students	300
9	Li Xiulin et al.	2012	The employees' emotions	College students	91
10	Zhang Jian	2003	Working environment, motivation, needs, etc.	Employees, graduates	459
11	Gu Rui et al.	2015	Leadership style, etc.	Health care workers	101
12	Pamela Tierney	2004	The employees' creativity, leadership support, working experience, job complexity, etc.	Managers	12
13	Bartol Kathryn	2010	Participation in the creative process, etc.	Employees	86
14	Kwok Leung	2014	Work motivation, etc.	Employees	112
15	Yu-Shan Chan	2015	Environmental factors	College students	160
16	Kani Ulge	2016	Creative thinking, etc.	College students	216
17	Dong gun An	2016	The employees' motivations and personality, etc.	College students	143
18	Jin Nam Choi	2004	Personal factors, organizational environment, etc.	College students	430
19	Jan Kratzer	2004	Team communication, team recognition, etc.	Employees	243
20	Eric Chong	2010	Individual factors, supervision, and working environment, etc.	Employees	350
21	Wasilu Suleiman	2013	Working attitude, etc.	Employees	70
22	L. Olsson, S	2012	The quantity of managers, leadership style, etc.	Managers, employees	137

(2) Literature Exclusion Criteria

First, the articles largely about the literature review of this topic should be excluded.

Second, repeated reports should be excluded.

Third, the literature without relevant correlation coefficients or data should be excluded.

Fourth, the literature without explicit scale measurement questions should be excluded, since these articles cannot appropriately describe the research objects.

(3) An Overview of the Selected Literature

In the initial screening process of the Meta-analysis by using Stata, all literature adopts an empirical research with available data. According to different dependent variables, the selected articles are grouped into six categories: the employees' emotions (3 articles), time pressure (2 articles), creative personality (4 articles), work motivation (6 articles), leadership and teamwork (6 articles), and feedback consistency (2 articles). This paper examines which factor affects the employees' creative performance; hence, there is no causal relationship between these documents. In other words, the data in each article should be considered separately. After the searching and screening process, the selected articles are shown in Table 1: Considering the large data used in the Meta analysis via Stata (a software), it is inconvenient to list all of them in the table above. In the calculation process, however, the paper, according to a calculation method named the overall effect size, will select the complete and appropriate data from these research articles as the study data.

3   Research Results

3.1   Description of the Research Data

(1) Overall Effect Value

First of all, according to the above-mentioned method, the paper calculates and sorts the data extracted from the selected research articles. This study contains a total of nine research articles, each of which contain multiple influencing factors. Hence, a total of 25 effect values are obtained. Next, the paper presents a description of the selected research articles and effect values.

The selected articles with various effect values are divided into different types according to the reference sources. Table 2 illustrates the type and quantity of the research articles containing different effect values.

In Table 2, the "Journal" shows the effect value extracted from the journal articles, the largest proportion of which is 80%. "Thesis" indicates the effect value extracted from the doctoral dissertations and master's theses, which is 8%. The effect value extracted from the research reports is 12%. Figure 1 clearly illustrates these data.

Second, the paper calculates all effect values listed in the literature. This study mainly considers the factors that affect the creative performance of employees; therefore, all the determinants with data integrity mentioned in the

Table 2. The quantity of effect values from different article types

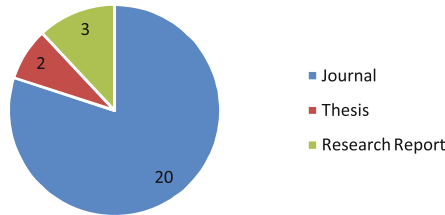|	Frequency	Percentage	Effective percentage
Journal	20	80%	80%
Thesis	2	8%	8%
Research report	3	12%	12%
Total	25	100%	100%

Fig. 1. Distribution of the quantity of effect values from different article types

selected documents are included in the table, even though they may influence each other. The specific data are shown in Table 3.

The distribution of the value of R and Z is clearly illustrated in Fig. 2, a line graph. In terms of the value of R, the average is 0.35; the standard deviation is 0.201; the maximum value is 0.71; the minimum value is -0.058; and the skewness is -0.219, which demonstrates negative skewness. As for the value of Z, the average is 0.62; the standard deviation is 0.410; the maximum value is 1.506; the minimum value is -0.086; and the skewness is 0.421, indicating positive skewness (See Table 4). Eventually, the paper, calculates the overall effect value of all literature, which is 0.551, generally indicating the positive correlation between the variables of the selected research articles and the employees' creative performance.

3.2   Homogeneity Test

The methods for homogeneity test include Q test, H test, chi-square test, forest plot. Using the Q test, the paper first calculates the Q value through the following equations:

$$Q = \sum_{i=0}^{k} wi(ri - R)^2, \tag{1}$$

$$R = \sum wiri / \sum wi, \tag{2}$$

where k represents the number of the effect values of the selected literature; r is the effect value; and w denotes the proportion of the effect value. The calculated values of R and Q are 0.313575684 and 0.040220883, respectively.

Table 3. Related data for the selected literature

| Number	Factor	R value	Z value	Sample size
1	Positive mood	0.228	0.301	495
2	Negative mood	0.054	0.082	495
3	Autonomous orientation	0.182	0.284	495
4	Control orientation	0.193	0.303	222
5	Features of time and pressure	0.33	0.543	60
6	Psychological satisfaction	0.419	0.718	60
7	Executive support	0.266	0.427	150
8	Need for autonomy	0.172	0.268	150
9	Capability requirement	0.243	0.387	150
10	Relationship requirement	0.277	0.447	150
11	Internal motivation	0.477	0.843	150
12	Motivation for identification	0.442	0.766	150
13	External motivation	−0.058	−0.086	150
14	Control motivation	−0.04	−0.06	150
15	Working motivation	0.395	0.669	150
16	Team performance	0.71	1.506	209
17	Team identity	0.509	0.917	209
18	Charismatic leadership	0.449	0.781	209
19	Concentration	0.585	1.11	162
20	Mastery approach goal orientation	0.485	0.861	162
21	Performance approach goal orientation	0.548	1.013	162
22	Performance avoidance goal orientation	0.348	0.577	162
23	Cognitive reevaluation	0.707	1.495	162
24	Inhibition of expression	0.431	0.743	162
25	Feedback consistency	0.33	0.543	159
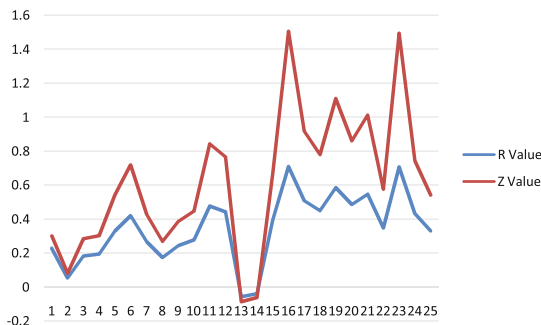
Fig. 2. Distribution of related data for the selected literature

Table 4. Description of statistical data of the selected literature

	N	Min	Max	Mean	Standard deviation	Skewness		Kurtosis	
							Standard error		Standard error
R value	25	0	1	0.35	0.201	−0.219	0.464	−0.158	0.902
Z value	25	0	2	0.62	0.41	0.421	0.464	0.184	0.902
Valid N (list state)	25								

The Meta results in Table 3 show that the 25 effect values are homogeneous. The Q test follows the chi-square distribution with a degree of freedom $K - 1$; hence, when the value of K is 25, the chi-squared value is 28.241 at a significance level of 0.05. In other words, if $Q = 0.040220883 < X^2_{0.02524} = 28.241$, then the selected research articles are homogeneous.

3.3 Bias Test

Bias test is considered essential in the meta-analysis. The publication bias refers to the different opportunities for publication and corresponding impacts on the results caused by the researchers, evaluators, editors' preferences of the direction and intensity of the research in the submission, acceptance, and publication process of an article. According to the book Conducting Meta-Analysis through Stata, there are multiple approaches to testing the publication bias, such as the funnel plot, Egger linear regression method, and Begg rank correlation method.

This paper uses the funnel plot, which is the most commonly used visualized method for a qualitative measurement of publication bias, first proposed by Light et al., in 1984. Figure 3 shows the funnel plot derived from the Meta-analysis of Table 3.
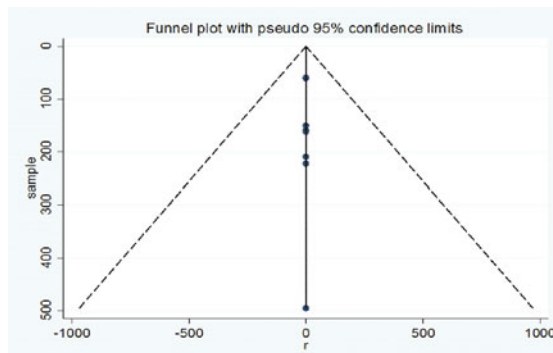

Fig. 3. The effect value of the selected literature

According to Fig. 3, there is no publication bias among the articles and theses used in this study, since the funnel plot is relatively symmetric.

4   Conclusions and Suggestions

It can be seen from overall effect values in Table 3 that when wholly considering the influencing factors (positive mood, negative mood, autonomous orientation, control orientation, time pressure, psychological satisfaction, supervisor support, autonomous need, relationship motive, internal motivation, external motivation, control motivation, working motivation, team performance, team identity, charismatic leadership, concentration, mastery approach goal orientation, performance approach goal orientation, performance avoidance goal orientation, cognitive reevaluation, inhibition of expression, feedback consistency), they are positively correlated to the employees' creative performance ($R = 0.551$). To enhance the creative performance, the managers may improve the employees' intrinsic motivation through incentive policies or through the executives' encouragement and support. Every employee, for the most part, will be affected by these factors; hence, this study, to some extent, may serve as a reference for the scholars or managers. Nevertheless, due to the possible interaction between these factors, their relationship with the employees' creative performance may be weak and accurate, which is the limitation of this paper. The author hopes that the future scholars of this field may clearly analyze this interaction.

We proposed suggestion as following: First, the future researchers may investigate the interaction between the factors impacting the employees' creative performance as well as explore the corresponding effects. The reason is because adjusting or changing one of the factors may indirectly influence other determinants, which contributes to a great change in the creative performance of the employees. Meanwhile, changing one factor may eliminate the effect of several factors, which may cause negative change in the staff creative performance. Second, the future researchers may examine the proportion of the effect of the individual factor on the creative performance. It assists managers to prioritize incentives so that the enterprise may maximize the profits at the lowest cost. Overall, joint efforts are needed in terms of enhancing the employees' creative performance.

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