Influences of Perceived Organizational Support on the Safety Management Performance of Airline

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Abstract. For the sake of exploring influences of perceived organizational support (POS) on safety management performance (SMP), and improving the level of SMP, the connotation indicators of POS and SMP in Airlines were set up, and the hypothesis model of POS and SMP was proposed. The 280 workers in 12 Airlines in China were enquired by means of questionnaires and the structural equation model (SEM) was used to verify the hypothesis. Results show that there is a significant positive correlation of the organizational identification of employee’s value with safety policy & target, safety risk management, safety supervision & measurement, safety culture, safety education & training, and downtrend of safety accidents. The organizational care of employee’s benefit is positively related to safety education & training, and the organizational support of employee’s work is also positively related to safety policy & objectives, and change of unsafe incidents. In safety management, the Airlines can improve their POS, especially organizational identification of staff value, to achieve high SMP.

1. Introduction

In civil aviation, the safety management has been as part of organizational management, and POS has become one of the important research topics in the field of safety management. Researches show that POS can affect the job attitude and job performance\cite{1-4}. Zhang\cite{5} indicates that different components of POS affect the miners’ unsafe behavior remarkably and enterprises can reduce the unsafe behavior of miners by improving the miners’ POS to improve coal mine safety management level. Liu\cite{6} illustrates that POS directly influence the employee’s job involvement and then influence the safety performance. Safety management work, as one of the works in an organization, is also influenced by POS. With the function of organization transiting information to employee, POS makes employee execute positive action which will influence safety management work to achieve high level of SMP. Therefore, it will be of great significance to clear-out the influence of POS on SMP aimed at improving both SMP and safety.

At present, when research on the influence of POS on SMP, the topics such as safety climate, safety culture are usually considered, but there is lack of the direct research on influence of POS. Griffin\cite{7} and Carol\cite{8} consider there is positive correlation between safety climate and safety involvement, and the safety climate and SMP influence each other. Fitzgerald\cite{9} and Glendon\cite{10} show there are the same characteristics of safety culture in different organization with high SMP, and safety culture directly influences the employee’s behavior and then influences the SMP. Ge...
zhihong[11] indicates there is correlation between POS and SMP in air control organizations, but the specific relationship is still needed to be made clearly. Though there are relative mature measurement scales for POS and SMP, the influence paths of POS to SMP, especially in civil aviation, are still needed to be found out.

With the purpose of exploring influences of POS on SMP and improving the level of SMP, the 280 workers in 12 Airlines are enquired by means of questionnaires and the structural equation model (SEM) was used to verify the hypothesis model. The specific influences of different components of POS on components of SMP are analyzed, which will provide new viewpoint for Airlines to improve their safety management.

2. Theory analysis and hypothesis model

2.1 Components of POS and SMP

Since the POS firstly put forward by Eisenberger, many researchers work on measurement of POS, influence factors of POS and influences of POS on work output. The POS compositied by three-dimensional mental structure is widely accepted, which includes the organizational identification of employee’s value, organizational care of employee’s benefit, and organizational support of employee’s work[12]. By the connotation analysis of POS, the sub-indexes under the three-dimensional indexes are determined as following, shown in Table 1.

| First level indexes                              | Second level indexes                  |
|--------------------------------------------------|---------------------------------------|
| P1: organizational support of employee’s work    | P1.1: superior support (SS)           |
| (OSEW)                                           | P1.2: workmate support (WS)           |
|                                                 | P1.3: job resources support (JRS)     |
| P2: organizational care of employee’s benefit    | P2.1: salary and welfare support (SWS)|
| (OCEB)                                          | P2.2: family care support (FCS)       |
|                                                 | P2.3: personal health support (PHS)   |
| P3: organizational identification of employee’s  | P3.1: further learning support (FLS)  |
| value (OIEV)                                     | P3.2: job promotion support (JPS)     |
|                                                 | P3.3: self-actualization support (SAS)|

Both the safety management process and safety results reflect the stand or fall of SMP in an organization. Comparing with the SMS[13], the safety management process includes safety policy & objectives, safety risk management, safety supervision & measurement, and safety education & training. The results of safety management reflect in two aspects, namely safety culture and downturn of safety accidents. Table 2 shows the components of SMP.

| First level indexes                              | Second level indexes                  |
|--------------------------------------------------|---------------------------------------|
| S1: safety policy & objectives (SPO)              | S1.1: formulation of safety policy & objectives (FSPO) |
|                                                 | S1.2: communication of safety policy & objectives (CSPO) |
|                                                 | S1.3: suitability of safety policy & objectives (SSPO) |
| S2: safety risk management (SRM)                 | S2.1: planning of safety risk management (PSRM) |
|                                                 | S2.2: implementation of safety risk management (ISRM) |
|                                                 | S2.3: effectiveness of safety risk management (ESRM) |
| S3: safety supervision & measurement (SSM)       | S3.1: planning of safety supervision & measurement (PSSM) |
|                                                 | S3.2: implementation of safety supervision & measurement (ISSM) |
|                                                 | S3.3: effectiveness of safety supervision & measurement (ESSM) |
2.2 Hypothesis Model

The influence of POS on SMP is actually reflected in the influence of components of POS on the components of SMP. There are three components in POS and six components in SMP. Therefore, we can make 18 hypotheses as following. The Figure 1 shows the original hypothesis model.

H1-H6: The organizational support of employee’s work significantly correlates to components index (from S1 to S6) in SMP respectively.
H7-H12: The organizational care of employee’s benefit significantly correlates to components index (from S1 to S6) in SMP respectively.
H13-H18: The organizational identification of employee’s value significantly correlates to components index (from S1 to S6) in SMP respectively.

2.3 Analysis Method

A set of questionnaire is designed to enquire the safety manager in Airlines to discuss the correlation of POS and SMP. There are three parts in the questionnaire. First part is general information of the employee, second part is the scale of the components of POS and the third part is the scale of the components of SMP. All the measurement scales adopt Five Likert Scale. The 280 effective questionnaires are withdrawn from 12 Airlines in China. The SPSS is used to analyze data to verify the rationality of original model.

3. Data analysis

3.1 Reliability and Validity of the Scale
The coefficient of Cronbach’s α is used as reliability coefficient to test the internal consistency of the questionnaires. The reliability coefficient of the whole scale is 0.959, and the reliability coefficient of each sub-scale is above 0.7 shown in Table 3, which shows the achieved data is reliable and it meets the requirements of questionnaire design.

| Latent variables | Numbers of observed variables | Results of Cronbach α |
|------------------|------------------------------|-----------------------|
| P1: OSEW         | 3                            | 0.832                 |
| P2: OCEB         | 3                            | 0.747                 |
| P3: OIEV         | 3                            | 0.778                 |
| S1: SPO          | 3                            | 0.826                 |
| S2: SRM          | 3                            | 0.851                 |
| S3: SSM          | 3                            | 0.871                 |
| S4: SET          | 3                            | 0.853                 |
| S5: CUI          | 1                            | -                     |
| S6: SC           | 4                            | 0.860                 |

Table 4 shows the results of KMO and Bartlett tests. The Bartlett's sphericity test results show that the Kaiser-Meyer-Olkin Measure (KMO) under adequate sampling is 0.917, which means the data is very suitable for factor analysis. There are strong correlations between the observed variables.

| KMO under adequate sampling | .917 |
|-----------------------------|------|
| Bartlett's sphericity test  |       |
| chi-square                  | 1908.163 |
| df                          | 325   |
| Sig.                        | .000  |

3.2 Fitting Analysis of the Model

3.2.1 Path coefficients. The path coefficient is the key factor to determine whether the original hypothesis model passes the test of significance. Using the AMOS software, the hypothesis correlations is verified and achieve the path coefficients of different variables. Table 5 shows the path coefficients. It can be seen that most significance factors are smaller than 0.01 (P < 0.01), for example, the path coefficient of S4: SET and P2: OCEB is 0.364, the Critical Ratio (CR) is 5.134, and the significance factors is smaller than 0.01, which means the path coefficients are significantly different with zero under 95% confidence. So there are significant correlations between the corresponding observed variations. Some path coefficients, for example, path coefficient of S6: SC and P1: OSEW, are not significantly different with zero. So these paths should be deleted from original hypothesis model.

| Variables | Variables | Estimate | S.E. | C.R. | P    | Label |
|-----------|-----------|----------|------|------|------|-------|
| S4: SET   | <--- P2: OCEB | .364     | .071 | 5.134 | *** par_18 |
| S1: SPO   | <--- P3: OIEV | 1.556    | .413 | 3.764 | *** par_19 |
| S4: SET   | <--- P3: OIEV | 1.520    | .410 | 3.705 | *** par_20 |
| S6: SC    | <--- P2: OCEB | .147     | .048 | 3.079 | .002 par_21 |
| S6: SC    | <--- P3: OIEV | 1.240    | .349 | 3.555 | *** par_22 |
| S6: SC    | <--- P1: OSEW | .215     | .086 | 2.512 | .012 par_23 |
| S1: SPO   | <--- P1: OSEW | .381     | .098 | 3.905 | *** par_24 |
| S2: SRM   | <--- P1: OSEW | .250     | .104 | 2.409 | .016 par_28 |
3.2.2 Assessment of fitting model. In SEM, the residual matrix is used to assess the fitting effects. The real variance covariance matrix $S$ and theoretical variance covariance matrix $\Sigma$ can be calculated. If the real variance covariance matrix $S$ does not differ the theoretical variance covariance matrix $\Sigma$ much, namely the elements of residual matrix is close to zero, the fitting effects is good. Table 6 shows the fitting indexes.

From table 6, it can be clearly seen that the absolute fitting indexes GFI (1.000) and RMR (0.000) and the relative fitting indexes NFI (1.000) and CFI (1.000) are very good, which shows the fitting effects of the model is very good.

Table 6. The fitting indexes

| Absolute fitting indexes | Criterion | Results |
|--------------------------|-----------|---------|
| CMIN                    | The smaller, the better | 0.000 |
| GFI                     | Greater than 0.9 | 1.000 |
| RMR                     | Smaller than 0.05, the smaller, the better | 0.000 |
| SRMR                    | - |
| RMSEA                   | - |
| relative fitting indexes |           |         |
| NFI                     | Greater than 0.9, the closer to 1, the better | 1.000 |
| TLI                     | - |
| CFI                     | 1.000 |
| Information indexes     |           |         |
| AIC                     | The smaller, the better | 702.000 |
| CAIC                    | - |

3.3 Adjustment of the Hypothesis Model and Results analysis

3.3.1 Adjusted model. The influence paths of latent variables of POS to the latent variables of SMP are various and the path coefficient of each path is not always desirable. So the poor fitting path coefficients should be moved out. The paths with negative path coefficient or path coefficient greater than 1 are deleted from hypothesis model. The influence paths with significance path coefficients are adjusted and then the main influence relationships between variables are achieved. After adjusting the original hypothesis model, the new path coefficients are achieved, shown in Figure 2.

Using Maximum Likelihood Estimation (MLE) method, the SEM fitting indexes are calculated, shown in Table 7. The CMIN and AIC in adjusted model are smaller than those in original model, which shows that the adjusted model is more fitting to observe data than original model.

Table 7. SEM fitting results

| Fitting indexes | CMIN | RMR | GFI | NFI | CFI | AIC   |
|-----------------|------|-----|-----|-----|-----|-------|
| original model  | 646.635 | 0.000 | 1.000 | 1.000 | 1.000 | 766.635 |
| adjusted model  | 627.436 | 0.000 | 1.000 | 1.000 | 1.000 | 759.750 |
3.3.2 Results of Model Verification. Results show that the path coefficients of paths P1: OSEW to S1: SPO, P1: OSEW to S5: CUI, P2: OCEB to S4: SET, P3: OIEV to S1: SPO, P3 OIEV to S2: SRM, P3 OIEV to S3: SSM, P3 OIEV to S4: SET, P3 OIEV to S6: SC are significantly different with zero under 95% confidence. So these hypotheses are correct and other hypotheses are wrong. Therefore, the organizational identification of employee’s value is positively correlated to safety policy & target, safety risk management, safety supervision & measurement, safety culture, safety education & training, and downtrend of safety accidents. The organizational care of employee’s benefit is positively related to safety education & training, and the organizational support of employee’s work is also positively related to safety policy & objectives, and change of unsafe incidents.

4. Conclusions
The influence of POS on SMP is cleared out by using the SEM. The three components of perceived organizational support, especially the organizational identification of employee’s value, influence safety management performance most. In safety management in civil aviation, we can take some actions to improve the safety management performance.

Firstly, when promoting the organizational identification of employee’s value, we should pay attention to job promotion support, because its influence is bigger comparing with further learning support and self-actualization support. So organizations should provide job promotion ways to strengthen the perceived organizational support.

Second, the personal health support is an important aspect in organizational care of employee’s benefit. Sufficient medical insurance, health examination and other action can reflect the
organizational care of employee’s benefit, which will influence the performance of safety education & training.

Last, the key point of promoting the organizational support of employee’s work is good workmate climate. Workmates are not only the mutual trust partner in work, but also the object of safety observation and safety education. Friendly interpersonal relationship is beneficial to implement of safety management work.

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