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Research Article

The Factors Analysis on Food Safety Accidents Statistics

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Abstract: The study uses SPSS17.0 analysis of validity and reliability of the food enterprises questionnaire. Using AMOS17. 0 software for structural equation model test of goodness of fit and analysis of on the path. From the "melamine" to "Sudanred" and "steroid-tainted pork" events that have been exposed recently, series of typical food safety incidents resulted in the emergence of food safety issues become the focus of attention. A series of food processing can be contaminated by harmful substances, resulting in harmful food, thus constituting food safety issues and poses a serious threat to public and person's health.

Keywords: AMOS 17.0, factors analysis, food safety incidents, SPSS17.0

INTRODUCTION

In recent years, the accidents of food enterprises happened frequently at home and abroad, a large amount of data shows that: the operators occupied the main position in the error factors of casualty accident, due to unsafe behavior such as operators of error operation cause of death and injuries accounted for more than 70% of the total number of accidents in food accidents. However, more than 90% of the food accident, directly or indirectly from unsafe behavior of employees in China. But in this study some food enterprises have an investigation about ten special type of work, 1205 employees' competency, 97.6% of employees think that the personal quality and ability can meet job requirements, 92.3% of food managers think that employees can able to meet job requirements. On the one hand, food enterprises human error ratio is so high, on the other hand, the food operators and managers agreed that the employee can be competent for the job requirements. Competency refers to the description in a specific work, organization environment and cultural atmosphere with excellent result of the objective evaluation of static characteristics (Luis *et al*., 2009). But the competent state is dynamic and is not invariable, because the impact of external factors will cause the transition between competent and incompetent. Food operators under the influence of adverse conditions will be qualified working not in the immediate state, easily lead to the mistakes in the work, even the occurrence of safety accidents. Therefore, to strengthen the food safety for operator for state recognition and to provide a new perspective for food safety management, in order to reduce operator errors and try to seek new solutions of unsafe behavior problems.

SECURITY OF INFLUENCING FACTORS FOR INVESTIGATION

Design questionnaire on the state food safety for safe operator: This survey is mainly on the investigation of food operators the last shift state of physiological function, psychological function, professional skills, process reliability and the safety performance. The questionnaire is quoted by Li Kete's six point scale.

In the state of physiological function, investigation, design the corresponding problem from four aspects of basic conditions, physical strength, stamina, energy; in the psychological status investigation, from the personal character, temperament, personal psychological tendency, attention, volition and consciousness level six aspects corresponding problems in design; professional skill state survey, design the corresponding problem from three aspects: professional knowledge, technology and work attitude; investigation of process reliability, from the information process of perception, recognition process and operation procedure three aspects corresponding problems in the design of safety performance; the survey, from the human error rate, error the event rate, violation incidence corresponding problem design.

MATERIALS AND METHODS

Questionnaire: In this study, the survey in food enterprise operators as the research object, through the questionnaire survey method to obtain reliable data, the actual analysis of the hypothetical situation, investigating a shift operator about state of physiological function, psychological function, professional skills, work reliability and safety performance. Questionnaires in the food operator l well

Table 1: The questionnaire Crobach 's coefficient

Factor	Value	Item number	Scale Crobach 's value
Physiological function	0.745	4	0.902
Psychological function	0.856	6	
Professional skills	0.913	3	
Process reliability	0.897	3	
Safety performance	0.916	3	

class will, the survey provided 400 questionnaires, recycling 385 copies, of which 356 valid questionnaires, the questionnaire has 85.3% efficiency, achieve the survey requirements.

Research methods: The use of SPSS17.0 analysis of validity and reliability of the questionnaire. Using AMOS17. 0 software for structural equation model test of goodness of fit and analysis of on the path. The food safety for operator competent state factors using structural equation model (SEM) method is verified.

Reliability and validity analysis: In this study, using the SPSS software tools and the use of Crobach's coefficient method to detect the (Mills, 1991) questionnaire. And the level of reliability validity is a questionnaire based good, influence on subsequent data analysis results, the reliability coefficient alpha values of the best >0.80 subscales and best >0.70. In the scale, if the internal consistency coefficient below 0.50, the total scale, reliability coefficient below 0.70, have to modify the scale and change the items. Table 1 lists the design of each subscale of the Crobach's coefficients, the values are greater than 0.7, the questionnaire reliability requirements.

The application of SPSS software to get the KMO test value and the questionnaire validity analysis of Rhee *et al*. (2009) method of test for Bartley sphere. According to Kaiser KMO>0.9, said very suitable; 0.8< KMO<0.9 for more than 0.7; in May, 0.6 when the effect is poor, if KMO<0.5 is not used for factor analysis. After data analysis that the value of KMO 0.835, greater than the critical value of 0.7, significant probability and factor values is 0, less than 0.001, thus, the questionnaire data obtained with factor analysis.

Theoretical analysis and research hypothesis: Elements of competency are those who work with work or performance directly related to the knowledge, ability, character, function or motivation, knowledge, skills, ability, motivation, ideas, values and interests of the integrated. Learned from the ergonomics theory, the human error factors include physiological, psychological content, professional skills. Physiological function including basic conditions, physical strength, endurance and energy; psychological content include the individual character, individual psychological tendency, to external stress, focus and concentration level; professional skills including professional knowledge, professional technology and working attitude. According to the human engineering theory and points out that the personnel physiological factors are fundamental to ensuring staff efficient, accurate operation. Height, audio-visual, arms, body weight, strength, heart and lung function is the basic condition to complete the assignment operator. The employee's physical strength, energy and stamina is to ensure the continued safe, efficient operations staff security. Safety psychology theory suggests that individual characteristics, staff attitude, stress psychological tendency and psychological acceptance of work will affect the staff work process reliability and safety performance directly. Employee distraction, awareness level and willpower is low is the main reason leading to reduced reliability of operation. Staff at the competent state must be aware, consciously govern their actions and can focus on work process, to ensure that the process is accurate and has good safety performance. According to the competence theories, the staff only has the knowledge and skills associated with high performance and high work desire and sense of responsibility, can reduce human error and achieve higher safety performance in the operating process. Reliability in operation process includes information awareness, the recognition process of judgment, reliability in operation process. Food enterprises to measure operational safety performance indicators include human error rate, violation rate and accident rate. The reliability of operation process is to ensure safe operation of the foundation and precondition of Elson *et al*. (2002). Only in the process of operation and high degree of reliability, human error rate can be reduced, the staff unconscious violation and accident will be reduced. Therefore, this study to detect, use the following constants such as:

H1: Physiological factors have a significant positive effect on employee job process reliability
H2: Physiological factors have a significant positive effect on employee safety performance
H3: Psychological factors have a significant positive effect on employee job process reliability
H4: Psychological factors have a significant positive effect on employee safety performance
H5: Professional skills factors have a significant positive effect on employee job process reliability
H6: Professional skills factors have a significant positive effect on employee safety performance
H7: Staff work process reliability has significant positive effect on employee safety performance.

Structural equation model: Based on the observed variables and the theoretical model, path, build relationships between observed variables and latent variables of the latent variable, model on the factors such as shown in Fig. 1 food safety for operator competence, compared with reliability block diagram and stoppage tree, Markov model take multiple reliability index into consideration, such as former two

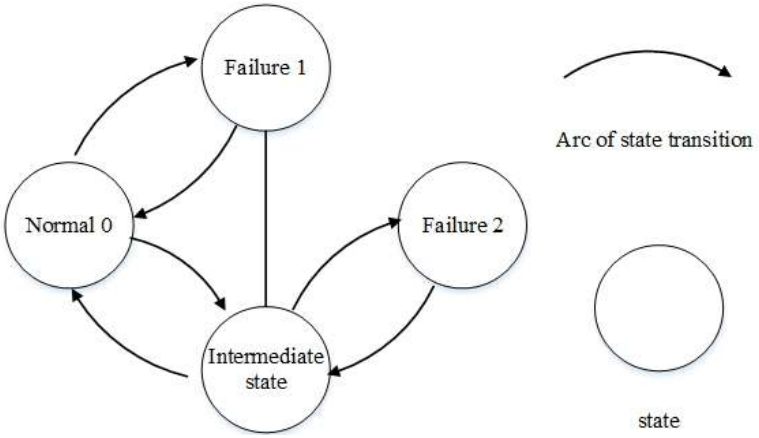

Fig. 1: State structural equation model of influencing factors for food safety for operator

Table 2: Hypothesis testing

Hypothesis	The path coefficient	Test value t	Result
H1: Physiological factors have a significant positive effect on employee job process reliability	0.758	3.65	Found
H2: Physiological factors have a significant positive effect on employee safety performance	0.139	1.102	False
H3: Psychological factors have a significant positive effect on employee job process reliability	0.539	4.045	Found
H4: Psychological factors have a significant positive effect on employee safety performance	0.102	1.277	False
H5: Professional skill factors have a significant positive effect on employee job process reliability	0.786	12.99	Found
H6: Professional skill factors have a significant positive effect on employee safety performance	0.832	12.04	Found
H7: Staff work process reliability has significant positive effect on employee safety performance	0.857	6.426	Found

average requirements, the calculation of disabled probability and average security disabled probability needs modeling twice, while using Markov model, just needs once. And reliability block diagram and stoppage tree needs condition of equipment' independence or mutual exclusion when calculating, while Markov didn't need that condition because of its time un-continuity. At the same time, Markov can not only analyze kinds of factors which can effect reliability like redundancy structure, common cause failure, periodical tests and repair, but reflect the changes between systems dynamically.

In this study is about the analysis and testing of the 10% significant level and the results are summarized in Table 2. Among them, assuming H2 and H4 did not pass the significance test, hypothesis cannot be established. H1, H3, H5, H6 and H7 pass the test of significance, hypothesis.

From the angle of theory analysis and common sense of life, the operator physiological and psychological factors have significant positive effect on employee work safety performance, but the empirical study shows that the food operator physiological factors and psychological factors have a positive effect on employee safety performance, but the effect is not significant. The empirical analysis come to an conclusion that function of physiology factors and psychological factors have a significant positive effect on the performance of staff work process reliability, staff work process reliability has significant positive effect on employee safety performance, which can deduce the operator physiological factors and psychological factors have positive effect on employee safety performance through the mediating variable process reliability. Based on the above empirical analysis, this article believes that food safety for operator competence status refers to the operation of work process with high reliability and good safety performance, with the individual state of physiological function, psychological function and professional skills, is a kind of dynamic state that moment.

RESULTS AND DISCUSSION

Fitness analysis: The application of AMOS17. 0 was used to analyze the structural equation model, ZHu and Bentler studies indicate that the maximum likelihood estimation method based on the use of RMR and TLI, BL89, CFI, Gamma, Hat, Mc, RMSEA index in a test model of. Therefore, this study uses RMR, TLI, CFI and RMSEA index test of model fit. Structural equation model analysis test results are summarized in Table 3.

From Table 3, the hypothesized model fit index accords with the assessment standard. Therefore, the data fitting degree and structural equation model is matching.

Path analysis: Through the model of structural equation analysis, summary the path coefficients between factor loadings, the latent variable and Table 4.

We can see from Table 4, the vast majority of test value t is greater than the 1.96 fitting requirements, load

Table 3: The model fitness analysis

The goodness of fit index	The calculated value	The ideal value	Result
X^2	262.407		
P	0.176	>0.05	Significant
X^2/df	1.848	<2	The ideal
RMR	0.043	<0.05	The ideal
RFI	0.803	>0.9	Not ideal
TLI	0.901	>0.9	The ideal
CFI	0.916	>0.9	The ideal
RMSEA	0.048	<0.05	The ideal

Table 4: The factor loading and path coefficient

Route	Standard estimates	Test value t	Route	Standard estimates	Test value t
ξ1→η1	0.758	3.6500	ξ2→x7	0.568	7.244
ξ2→η1	0.539	4.0450	ξ2→x8	0.595	7.579
ξ3→η1	0.786	12.990	ξ2→x9	0.673	8.575
ξ1→η2	0.139	1.1020	ξ2→x10	0.679	8.652
ξ2→η2	0.102	1.2770	ξ3→x11	0.850	8.105
ξ3→η2	0.832	12.004	ξ3→x12	0.875	8.159
η1→η2	0.857	6.4260	ξ3→x13	0.583[b]	5.252
ξ1→x1	0.662	7.9140	η1→y1	0.586[b]	
ξ1→x2	0.703[b]	8.21	η1→y2	0.726	7.176
ξ1→x3	0.835	9.305	η1→y3	0.678	6.883
ξ1→x4	0.529	6.426	η2→y4	0.773[b]	
ξ2→x5	0.692	7.914	η2→y5	0.811	9.723
ξ2→x6	0.728[b]		η2→y6	0.630	7.847

The factor loading with superscript "B" index in non standard case is fixed at 1, without calculating the T values

factor of 2 and ξ 1, latent variable ξ 2, 1 and ξ 3, ETA ETA were greater than 0.5, visible observation variables can explain the latent variables and the corresponding.

Countermeasures: In order to ensure the food operator in safe competent state, so as to further enhance the safety performance, through the following ways:

The establishment of food operators physiology condition assessment mechanism: In the daily safety management in food, food operators should establish the physiological functional state evaluation mechanism (Zhengxiang, 2010). The scientific evaluation of the operator into the basic conditions, the body well before the physical strength, endurance and energy, to detect food the state of physiological function to do shift work requirements. If the state of physiological function is not equal to shift work requirements, namely Tilibuzhi, fatigue, should be based on the functional state of the operator physiological make adjustments to their task, in severe cases will be banned from entering the well operation. Will effectively eliminate fatigue or even work in spite of the phenomenon through the establishment of scientific evaluation mechanism of food operators state of physiological function, so as to enhance the operation reliability, reduce human errors.

The establishment of psychological function operator food evaluation mechanism: In the changeable and complicated social environment, each worker is in a different environment, experiencing a variety of shocks, when workers face an important choice or family crisis, the balance of heart will be broken, when the psychological burden and overloading, operator a sense of inner balance is not timely reconstruction, will cause the workers distracted, stress disorder, weak willpower, arousal level drop and a series of consequences, psychological state of unhealthy can no longer competent job requirements. Therefore, through the establishment of evaluation mechanism of mental function operator food effective psychological function no longer competent state selected staff work requirements and psychological intervention in its, make its attention, awareness for the arousal level, will force capable of operating requirements.

The establishment of food operators matching mechanism of psychological factors: Food enterprises in the process of hiring employees or arrange task, not only to pay attention to professional skills, deal with the employee's personal character, temperament and personality (interest, values, etc.) to make scientific evaluation and post matching degree and according to the evaluation results of staff posts and make reasonable adjustments. By matching mechanism can effectively improve the matching degree of employee personality psychology and post food operators to establish psychological factors, effectively improve the working interest, so that the right people in the right positions, improve process reliability.

Improve the food operator skill factors evaluation mechanism: Professional skill factors of food operators are the basis for the correct and safe operation of the staff. In the food operators pre-evaluation system, need the professional function factors, selected to meet the requirements of the staff, for the incompetent employees, need to further strengthen the education and training of professional skills, only to meet job requirements and then arrange the work.

CONCLUSION

With the development of technology, the new food questions emerging are inevitable. The improvement and solve method of food safety system is a long process. Because the food safety for operator for state by state of physiological function, psychological function and professional skills of States, is the immediate state of a dynamic. Professional skills and operation reliability of food operators have a significant positive effect on employee safety performance, physiological factors, psychological function factors through operation reliability has a positive impact on the safety of the staff performance.

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