

FIELD STUDY

Outcomes for facilitators of workplace environment improvement applying a participatory approach

Etsuko Yoshikawa¹  | Kazutaka Kogi²¹Japanese Red Cross Collage of Nursing, Tokyo, Japan²The Ohara Memorial Institute for Science of Labour, Tokyo, Japan**Correspondence**Etsuko Yoshikawa, Japanese Red Cross Collage of Nursing, 4-1-3 Hiroo, Shibuya-ku, Tokyo, 150-0012, Japan.
Email: e-yoshikawa@redcross.ac.jp**Funding information**

Japan Society for the Promotion of Science, Grant/Award Number: 23593197

Abstract

Objectives: The purpose of this study was to determine changes in awareness, behavior, and relationships among facilitators who were involved in facilitating the conduct of the participatory workplace improvement program and to examine the facilitators' outcomes as a result of their active involvement in the program. The outcome components were also examined in relationship to their associations with various factors.

Methods: An anonymous self-administered questionnaire survey was conducted for 83 facilitators. Exploratory factor analysis was applied to determine the facilitators' outcomes. The relationship between those elements which influenced the outcomes was taken into account by means of hierarchal multiple regression analysis.

Results: The outcomes for facilitators consisted of four sub-concepts: "knowing practical ways and strategies to ensure full participation," "building confidence and self-development," "improving safety and health-risk sensitivity," and "gaining better-than-expected results based on developing relationships with workers." According to the results of hierarchal multiple regression analysis, facilitators' outcomes were significantly associated with the realization of creativity, sense of solution for safety and health issues, and facilitators' involvement.

Conclusions: It is suggested that the role of a facilitator dynamically changes through a participatory workplace improvement program as a key person in the workplace. Supporting acting facilitators' initiatives in the process of workplace improvement programs, as well as promoting the active involvement of workers and managers were considered useful for effective implementation of workplace improvement programs.

KEYWORDS

facilitators, outcomes, participatory approach, workplace improvement

1 | INTRODUCTION

Participatory workplace environmental improvement programs are gaining importance as a practical means of

promoting occupational safety and health (OSH) activities at the workplace. The emphasis of these programs is generally placed on self-management that focuses on behavior-oriented low-cost and multiple-area improvements based on

good practices with active involvement of both workers and employers.^{1,2} These programs commonly use practical tools such as good example photo sheets, action checklists, and group work methods. The participatory approach improving working conditions and workplace environment is widely applied for the solution of OSH issues in various employment conditions in Japan.³ In previous studies, the approach was identified as an effective and practical method for promoting comprehensive risk management involving both workers and employers.^{4,5} However, many articles about the outcomes of workplace environment improvement considered only the results of improvements, such as whether a safer and healthier work environment was achieved or OSH issues were addressed in participatory programs.^{4,6-14} In contrast, as seen in the Community-Based Participatory Research (CBPR), findings in effective methods for solving community's health issues have been accumulated and the multifaceted evaluation systems are developed.¹⁵ In addition to the resolved health issues, CBPR also usually focuses on competency development of the whole communities and the residents and describes the dynamic outcomes which are being disseminated over the whole community areas.¹⁶

The aim of the participatory approach for improving workplace environment was therefore not limited to simply improving workplace environments. In the process of the participatory approach, workers may achieve dynamic changes such as self-enlightenment and mutual support in the workplace through direct participation in activities and solving issues by using practical tools and group work methods. The approach thus increases awareness and competencies of all workers and creates a positive atmosphere in the workplaces. Therefore, it should be possible to clarify components of the outcomes obtained from participatory approaches. This can be achieved by focusing on the components of the viewpoint and structure of an evaluation such as the awareness and behavior of workers, and changes in relationships among the workers in addition to the results of the improvement or solutions of OSH issues by the workplace environmental improvements.

Workers selected to play the role of the key persons in the participatory approach program are called facilitators, and their main function is to sustain the initiative for planning and implementing the participatory work improvement programs and evaluating the outcomes. There are many studies that addressed the roles of the facilitators in the participatory workplace environment improvement programs.¹⁷⁻²² However, very few of them mention the changes which occurred to the facilitators as a result of taking part in the participatory approach. The facilitators play critical roles in these programs by their competencies in the participatory approach. In clarifying the viewpoint and components of the evaluation, the outcome of the facilitators will enable us to set a framework that promotes the workplace environment improvement more

effectively and provide practical support for the facilitators. This knowledge of the outcomes is deemed to be the key components for identifying the necessary support that OSH professionals provide in order to promote the participatory workplace environment improvement, and to contribute toward raising the quality level of OSH activities.

The purpose of this study was to determine changes in awareness, behavior, and relationships among facilitators who were involved in facilitating the conduct of the participatory workplace environment improvement programs and to examine the outcome components of facilitators as a result of their involvement in the participatory program. The relationships of these outcome components to associations with various factors were discussed.

2 | METHODS

2.1 | Study design

The present study applied a cross-sectional design. An anonymous self-administered questionnaire survey was conducted from November 2013 to April 2015. A questionnaire designed by the researchers was used in this study. The conceptual framework of the outcomes of the facilitators was set as the hypothetical model.²³ Components of the outcomes were clarified and the factors associated with the outcomes were examined by statistical analysis.

The Research Ethics Review Board of the St. Luke International University approved the study procedures (No.13-042). The aims and procedures of this study were explained in the questionnaire and consent was obtained from each participant when completing the questionnaire.

2.2 | Subjects

The participants of the study were facilitators working at the workplace that was implementing the participatory work improvement programs within three months. These participants were recruited through networking processes by the authors. There are some recommendations regarding the minimum necessary sample size range such as from $n = 100^{24}$ to $n = 250^{25}$. Similarly, recommendations regarding the proper factor-to-variable ratio ranged from 3 to 6²⁵ to at least 10.²⁶ Hair et al²⁷ proposed at least five cases for each item should be needed for exploratory factor analysis (EFA). Before collecting data, our goal was recruiting a total of 72-120 participants. Although we collected a total of 89 data sets, we were unable to collect more than the desired number of participants from our network in the research period.

We sent the questionnaire to 89 workplaces of three organizations that accepted the research approval. The participants from these organizations were local administration

employees engaged in office work or technical services for community residents. Of the 89 subjects contacted, 85 responded (a response rate of 95.6%). Two subjects who did not give full answers of the 24 items of facilitators' outcomes were not included in the study. Eighty-three responses were analyzed in the study (a valid response rate of 93.3%).

2.3 | Concepts and measurement tools for the research

2.3.1 | Background of the participants

The background of the participants included personal factors and workplace-specific characteristics. The background factors of the facilitators and their workplaces were taken into consideration in the research. With regard to personal factors, questions were asked about the age, gender, years of experience, occupation, job position, marital status, and whether they had children.

For the specific characteristics of the workplace, facilitators were asked about the size of the workplace (number of workers), average overtime hours, and atmosphere in the workplace such as relationships with colleagues and the work environment. The atmosphere in the workplace was assessed by a part of the New Brief Job Stress Questionnaire²⁸ (New BJSQ) by considering related elements such as workplace social capital and work environment. These items were scored on a 4-point Likert Scale. The validity and reliability of the New BJSQ have been supported.²⁸

2.3.2 | Program factors

Relevant program factors were assessed by a 5-point Likert Scale ranging from 1 (never) to 5 (agree) about involvement and satisfaction of the workplace environment improvement program. The program factors included the number of years for implementation in the workplace environment improvement program and how many cases and what measures for workplace environment improvement were applied as well as the contents and quantity of achievements gained.

2.3.3 | Outcome variables

The obtained outcomes were categorized into two types: those obtained by the participatory approach, and the others obtained directly from the various aspects of their involvement in the workplace environment improvement processes.

The outcomes for the facilitators were measured by the changes in facilitators' awareness and behavior concerning health and safety, and changes in relationships concerning the following five subordinate concepts. The facilitators' outcomes thus consisted of five categories and 24 items based

on a previous study.²³ These items, that were extracted from the qualitative study²³, were scored on a 4-point Likert Scale ranging from 1 (disagree) to 4 (fully agree).

The outcomes resulting from workplace environment improvement were measured by using a 5-point Likert Scale about the sense of problem solving in the workplace improvement program. Also, work productivity, job satisfaction, and physical and emotional health status were assessed. Work performance and job satisfaction were assessed by a part of the New BJSQ²⁸ realization of creativity and job satisfaction. These items were scored on a 4-point Likert Scale. The facilitators' physical and emotional health was analyzed by the Medical Outcome Study 8-Item Short-Form health Survey (SF-8™).²⁹ SF-8™ was used to assess the health-related Quality of Life (QOL). The questionnaire consisted of eight items, which had eight subscale scores, such as physical functioning, role physical, bodily pain, general health perception, vitality, social functioning, role emotional, and mental health. The response to each item was scored by norm-based scoring based on a national standard value, which was calculated by score distribution of the public, and then converted into subscale scores. In addition, the results obtained by means of the physical component summary and the mental component summary, which indicated physical and mental QOL, respectively, were calculated by a regression equation based on each scored item.

2.4 | Data analysis

The responses obtained were analyzed by applying statistical analysis packages IBM® SPSS® Statistics 21.0. Two-tailed significance for analysis was set at $P < 0.05$.

Before performing the factor analyses, quality control for the dataset was provided by using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. The corresponding KMO values were 0.889, indicating the sampling was adequate. The EFA on 24 items of the facilitators' outcomes was used to determine outcome elements of the facilitators and improvement results in the participatory workplace environment improvement. An eigenvalue more than one was set as the criterion for factor extraction. One item (item 4: I feel the workplace is safer and better after solving issues) was dropped because of low factor loading (<0.4). Then, another EFA was conducted with the remaining 23 items.

Then Cronbach's α was calculated to confirm internal consistency. The Cronbach's alpha coefficient was 0.95 for the 23 items. The coefficients for each subscale were 0.93, 0.90, 0.83, and 0.84 for factor 1, 2, 3, and 4, respectively. The internal consistency coefficients were good at acceptable levels.

The relationship between those elements which influenced the outcomes was taken into account by means of hierarchical multiple regression analysis. This hierarchical multiple

regression analysis was performed with the simultaneous forced entry method by adding independent variables in multiple steps to observe the standardized regression coefficient β and the adjusted coefficient of determination (adjusted R^2). A variable for personal factors and workplace-specific factors was entered for model 1. For model 2, related program factors were entered (i.e., years for introduction of the participatory programs, involvement, satisfaction, and number of improvements). Regarding model 3, the following set of outcomes for workplace environment improvement variables were entered: sense of solution for OSH issues, the work productivity, job satisfaction, and the health-related QOL. All variables inputting to the regression analyses had no missing data so that complete case analysis was applied.

3 | RESULTS

3.1 | Demographic characteristics of the study subjects

Table 1 shows demographic characteristics of the participants. The average age was 47.2 ± 8.2 years, and more than 80% of the facilitators were male. About 64% of the facilitators were at a chief position, and other facilitators were sub-managers (18.1%), staff members (15.7%), and workplace-level managers (1.2%). The mean years of experience at the workplace of the participants was 8.8 ± 11.4 years, and their years of experience as a facilitator amounted to 1.6 ± 1.4 years.

The mean years of the introduction of the workplace environment improvement program in the participants' workplace were 1.7 ± 1.6 years, and 51 workplaces were at the first year of the introduction of the workplace environment improvement program (61.4%). In these programs, facilitators were usually recommended to make one to three improvement action plans. In this study, about 80% of the facilitators planned and implemented either one, two, or three improvement plans.

In total of 167 improvements, 89 cases were classified in the categories of work methods, 31 cases were related to communication, 29 cases were about work environment, each eight cases concerned mutual support and access to care, and two cases were related to working schedules.

3.2 | Outcomes for facilitators of workplace environment improvement applying a participatory approach

The result of this factor analysis was shown in Table 2. The outcomes for the facilitators consisted of four sub-concepts. Factor 1 consisted of 10 items and was labeled “knowing practical ways and strategies to ensure full participation.” Factor 2 consisted of five items and was labeled “building confidence and self-development.” Factor 3 consisted of

three items and was labeled “improvement of sensitivity concerning health and safety risks.” Factor 4 consisted of five items and was labeled “gaining better-than-expected results based on developing relationships with workers.”

3.3 | Associations with various factors related to outcomes of facilitators

To identify factors affecting facilitators' outcomes, a hierarchical multiple regression analysis was performed (Table 3-6).

The major related factors (and β) of the “knowing practical ways and strategies to ensure full participation” were sense of solution for OSH issues (0.32) and realization of creativity (0.42) with an explanatory power of 47.6% (Table 3). In Model 1, among background of the participants, the number of years of experiences as a facilitator (0.28) was found to have significant associations, with an explanatory power of 5.7%. When program factors were entered for Model 2, the results were insignificant.

The major related factors (and β) of the “building confidence and self-development” were involvement (0.30) and realization of creativity (0.45) with an explanatory power of 54.1% in Model 3. In Model 1, among background of the participants, the number of years of experiences as a facilitator (0.35) had a significant association, with an explanatory power of 10.4%. When the program factors were entered for Model 2, involvement (0.42) had a significant association, with an explanatory power of 33.7% (Table 4).

The major related factor (and β) of “improvement of sensitivity concerning health and safety risks” was realization of creativity (0.44) with an explanatory power of 38.7% for Model 3. In Model 1, among background of the participants, years of experiences as a facilitator (0.29) were significantly associated with an explanatory power of 8.5%. When program factors were entered for Model 2, the results were insignificant (Table 5).

Table 6 shows the major related factor (and β) of “gaining better-than-expected results based on developing relationships with workers” was realization of creativity (0.46) with an explanatory power of 30.2% in Model 3. When the background of the participants and program factors were entered for Model 1 and 2, the results were insignificant.

4 | DISCUSSIONS

This study was aimed to clarify the outcome components of facilitators as a result of their actions in workplace environment improvement applying the participatory approach and to examine their associations with various factors. We investigated the relationships with the attendants, program factors and related outcomes as a result of workplace

TABLE 1 Demographic and characteristics of participants (n = 83)

| Caracteristics | n | % | Mean ± standard deviation |
|---------------------------------------|----|------|---------------------------|
| Age | 82 | | 47.2 ± 8.2 |
| Gender | | | |
| Male | 67 | 80.7 | |
| Female | 15 | 18.1 | |
| No response | 1 | 1.2 | |
| Type of job | | | |
| Clerical staff | 57 | 68.7 | |
| Technology staff | 23 | 27.7 | |
| Others | 2 | 2.4 | |
| No response | 1 | 1.2 | |
| Position | | | |
| Manager | 1 | 1.2 | |
| Sub manager | 15 | 18.1 | |
| Chief | 53 | 63.8 | |
| Staff | 13 | 15.7 | |
| No response | 1 | 1.2 | |
| Years of experience at the workplace | 82 | | 8.8 ± 11.4 |
| Years of experience as a facilitator | 82 | | 1.6 ± 1.4 |
| Years introduction of the WEI program | 77 | | 1.7 ± 1.6 |
| 1 | 51 | 61.4 | |
| 2 | 18 | 21.7 | |
| 3 | 3 | 3.6 | |
| ≥4 | 5 | 6.0 | |
| No response | 6 | 7.2 | |
| Number of plans | | | |
| 1 | 20 | 24.1 | |
| 2 | 15 | 18.1 | |
| 3 | 31 | 37.3 | |
| ≥4 | 9 | 10.8 | |
| No response | 8 | 9.6 | |
| Number of improvements | | | |
| 1 | 28 | 33.7 | |
| 2 | 17 | 20.5 | |
| 3 | 21 | 25.3 | |
| ≥4 | 9 | 10.8 | |
| No response | 8 | 9.6 | |
| Overtime working hours per month | 80 | | 5.5 ± 8.9 |
| Marriage | | | |

(Continues)

TABLE 1 (Continued)

| Caracteristics | n | % | Mean ± standard deviation |
|----------------|----|------|---------------------------|
| Yes | 57 | 68.7 | |
| No | 24 | 28.9 | |
| No response | 2 | 2.4 | |
| Children | | | |
| Yes | 51 | 61.4 | |
| No | 30 | 36.1 | |
| No response | 2 | 2.4 | |

environment improvement, by examining the characteristics of the facilitators' outcomes confirmed as a result of this study.

4.1 | Characteristics of the outcomes relevant to the facilitators

In the study, the outcomes for the facilitators were found to consist of four concepts. Based on these findings, it is suggested to examine the characteristics of the facilitators' outcomes in the use of participatory approaches. Among the previous studies concerning the roles of the facilitators, several studies have already reported the situations in which workplace safety and health issues were resolved as results of the improvements.⁶⁻¹⁴ However, few studies have focused on the underlying aspects such as outcomes resulting from the use of a participatory approach.²³ It is considered that our study is different from other previous studies in this aspect.

In the hypothesis model²³, the outcomes relevant to the participatory approach consisted of five concepts. As a result of the factor analysis conducted, however, we confirmed that the facilitators' outcomes consisted of four factors. The two concepts of the hypothesis model such as "building relationship with workers" and "gaining better-than-expected results" were extracted each as an integrated factor. This was because the facilitators within the roles of promoting workers' involvement^{21,22} focused on encouraging a strategic approach with the continual action-oriented process taken by workers and managers as well as the consensus building through each participatory workplace environment improvement program. It is assumed that these outcomes including the strategic aspect with the role of a facilitator who acted to involve workers may relate to the initiative based on good relationships with workers. We confirmed the factor structure for all these items, as indicated by the satisfactory Cronbach's alpha coefficient.

Accordingly, as shown by the results, the characteristics of the facilitators' outcomes as those of a key person of the participatory programs may compare the following three aspects; changes of awareness and behavior as facilitators, achieving better results, and strategic attitude. The

TABLE 2 Exploratory factor analysis of the outcomes for facilitators

| Item | | Factor loading | | | |
|---|--|----------------|----------|----------|----------|
| | | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| Factor 1: Knowing practical ways and strategies to ensure full participation ($\alpha = 0.93$) | | | | | |
| 12 | I became aware of the importance of being considerate toward the workplaces culture and customs in a work environment improvement program | 0.927 | -0.048 | -0.121 | -0.010 |
| 20 | I started thinking of the processes that start with trials and errors gradually and permeate increasingly | 0.790 | 0.130 | 0.118 | -0.222 |
| 22 | I became aware of the importance of understand the meaning of the participatory approach and take action in the whole workplace | 0.751 | -0.053 | -0.301 | 0.334 |
| 19 | I started to think how to raise the workers' enthusiasm | 0.685 | 0.108 | -0.107 | 0.179 |
| 9 | I became aware of the importance of opinions and ideas of other co-workers | 0.598 | 0.042 | 0.064 | 0.115 |
| 24 | I became aware of the necessity of continual action of work environment improvement with the participatory approach, and started making plans for the upcoming improvement program | 0.485 | 0.337 | 0.276 | -0.154 |
| 8 | I became aware of the importance of communications with the other co-workers | 0.480 | -0.081 | 0.315 | 0.068 |
| 15 | I understood that the other co-workers would do well with what I am doing with them | 0.479 | 0.079 | 0.202 | 0.095 |
| 23 | I became aware of the importance of utilizing good practices from other workplaces | 0.468 | 0.088 | 0.382 | -0.248 |
| 21 | I became aware of the importance of gaining every worker's understanding of willingness of participation | 0.408 | 0.053 | 0.166 | 0.229 |
| Factor 2: Building confidence and self-development ($\alpha = 0.90$) | | | | | |
| 14 | I understood how to conduct the work environment improvement with the participatory approach to adjust the workplace | -0.068 | 0.944 | 0.084 | -0.089 |
| 17 | I gained confidence as the facilitator | -0.075 | 0.833 | -0.041 | 0.183 |
| 18 | I feel the other co-workers accepted the actions for WEI with the participatory approach, and the workers started thinking how to participate and how to improve | 0.155 | 0.731 | -0.209 | 0.187 |
| 13 | Although I initially did not know what to do as a facilitator, I gained confidence through the experience | 0.147 | 0.474 | 0.127 | 0.094 |
| 16 | I become a positive thinker | 0.157 | 0.439 | 0.160 | 0.094 |
| Factor 3: Improvement of sensitivity concerning health and safety risks ($\alpha = 0.83$) | | | | | |
| 1 | I became aware of the necessity to be sensitive to health and safety on a daily basis | -0.070 | 0.053 | 0.748 | 0.051 |
| 2 | I became more aware of health and safety risks in the workplace | -0.155 | -0.018 | 0.746 | 0.185 |
| 3 | I started to think about the causes when an accident occurs | -0.075 | -0.001 | 0.715 | 0.243 |
| Factor 4: Gaining better-than-expected results based on developing relationships with workers ($\alpha = 0.84$) | | | | | |
| 6 | I am pleased that other co-workers accepted the approach positively and took action | 0.070 | 0.241 | -0.020 | 0.623 |
| 7 | I feel communication with other co-workers became easier through the activities of work environment improvement with the participatory approach | 0.043 | 0.047 | 0.236 | 0.615 |

(Continues)

TABLE 2 (Continued)

| Item | | Factor loading | | | |
|------|---|----------------|----------|----------|----------|
| | | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
| 5 | I feel I achieved more than I expected | 0.033 | 0.155 | 0.132 | 0.519 |
| 11 | I understood that the workers would follow the rules which were decided by themselves | −0.131 | 0.051 | 0.142 | 0.472 |
| 10 | I became able to entrust the work to be done to the workers with confidence | 0.372 | −0.314 | 0.357 | 0.416 |

TABLE 3 Hierarchical multiple regression analysis of the factors that were related to the outcomes for facilitators as knowing practical ways and strategies to ensure full participation (n = 83)

| | Model 1 | | Model 2 | | Model 3 | |
|--|---------|----------|---------|----------|---------|----------|
| | β | <i>P</i> | β | <i>P</i> | β | <i>P</i> |
| Background of the participants | | | | | | |
| Years of experience as a facilitator | 0.28 | 0.02 | 0.08 | 0.62 | 0.03 | 0.83 |
| Workplace social capital | 0.17 | 0.15 | 0.04 | 0.73 | 0.05 | 0.59 |
| Work environment | −0.03 | 0.82 | 0.09 | 0.47 | 0.06 | 0.57 |
| Program factors | | | | | | |
| Years for introduction the program | | 0.18 | 0.27 | 0.19 | 0.15 | |
| Involvement | | | 0.24 | 0.05 | 0.10 | 0.33 |
| Satisfaction | | | 0.20 | 0.14 | −0.01 | 0.92 |
| Number of improvements | | | 0.14 | 0.27 | 0.01 | 0.99 |
| Outcomes resulting from workplace environmental improvements | | | | | | |
| Sense of solution for OSH issues | | | | | 0.32 | 0.01 |
| Realization of creativity | | | | | 0.42 | 0.00 |
| Physical component summary | | | | | −0.12 | 0.21 |
| Adjusted R ² | 0.057 | | 0.185 | | 0.476 | |
| ΔR^2 | | | 0.128 | | 0.291 | |

facilitators thus undertake risk management for safety and health at the workplace through participatory workplace environment improvement programs.^{5,20} This experience may lead to improving practical skills for facilitating the workplace environment improvement steps. And facilitators' outcomes as a new concept suggest that they integrate changes in the relationships among workers with a view to achieving better results. While playing the role of the facilitators, the facilitators as a general practice strengthened the relationships among workers through increasing communication such as opportunities to introduce the workplace environment improvement program and conduct group discussions at the workplace. It is suggested that the facilitators promote better results so that the workers change to take positive reactions and accept the work improvement as a result of the facilitators' strategic approach. On the other

hand, the process of EFA one item was dropped because of low factor loading. The item for feeling of achievements related to the program resulting in a safe and healthy workplace may be necessary for continuing workplace environment improvements for a long period. As a result of work improvements programs, facilitators might notice the need to improve relationships among colleagues more explicitly than solving safe and health problems at a less experienced workplace. The participants of this study had relatively little experience as facilitators. Therefore, it is necessary to consider following the differences and changes in outcome by years of experience in the future.

Furthermore, workers are encouraged to accept work improvements in the affirmative with increased positive changes in relation to their facilitators. These findings are the same as in the previous studies. In the findings of CBPR,^{16,30}

| | Model 1 | | Model 2 | | Model 3 | |
|--|---------|----------|---------|----------|---------|----------|
| | β | <i>P</i> | β | <i>P</i> | β | <i>P</i> |
| Background of the participants | | | | | | |
| Years of experience as a facilitator | 0.35 | 0.00 | 0.26 | 0.08 | 0.22 | 0.07 |
| Workplace social capital | 0.18 | 0.12 | 0.07 | 0.54 | 0.10 | 0.29 |
| Work environment | -0.10 | 0.38 | 0.02 | 0.85 | -0.02 | 0.84 |
| Program factors | | | | | | |
| Years for introduction the program | | 0.03 | 0.85 | 0.03 | 0.83 | |
| Involvement | | | 0.42 | 0.00 | 0.30 | 0.00 |
| Satisfaction | | | 0.08 | 0.49 | -0.07 | 0.53 |
| Number of improvements | | | 0.21 | 0.07 | 0.07 | 0.50 |
| Outcomes resulting from workplace environmental improvements | | | | | | |
| Sense of solution for OSH issues | | | | | 0.16 | 0.15 |
| Realization of creativity | | | | | 0.45 | 0.00 |
| Physical component summary | | | | | -0.06 | 0.49 |
| Adjusted R ² | 0.104 | | 0.337 | | 0.541 | |
| ΔR^2 | | | 0.233 | | 0.204 | |

TABLE 4 Hierarchical multiple regression analysis of the factors that were related to the outcomes for facilitators as building confidence and self-development (n = 83)

| | Model 1 | | Model 2 | | Model 3 | |
|--|---------|----------|---------|----------|---------|----------|
| | β | <i>P</i> | β | <i>P</i> | β | <i>P</i> |
| Background of the participants | | | | | | |
| Years of experience as a facilitator | 0.29 | 0.01 | 0.15 | 0.38 | 0.11 | 0.45 |
| Workplace social capital | 0.19 | 0.11 | 0.09 | 0.49 | 0.09 | 0.39 |
| Work environment | 0.08 | 0.51 | 0.11 | 0.38 | 0.06 | 0.60 |
| Program factors | | | | | | |
| Years for introduction the program | | 0.13 | 0.45 | 0.12 | 0.38 | |
| Involvement | | | 0.04 | 0.74 | -0.08 | 0.44 |
| Satisfaction | | | 0.28 | 0.05 | 0.10 | 0.42 |
| Number of improvements | | | -0.01 | 0.95 | -0.16 | 0.18 |
| Outcomes resulting from workplace environmental improvements | | | | | | |
| Sense of solution for OSH issues | | | | | 0.24 | 0.05 |
| Realization of creativity | | | | | 0.44 | 0.00 |
| Physical component summary | | | | | -0.18 | 0.09 |
| Adjusted R ² | 0.085 | | 0.113 | | 0.387 | |
| ΔR^2 | | | 0.027 | | 0.274 | |

TABLE 5 Hierarchical multiple regression analysis of the factors that were related to the outcomes for facilitators as improvement of sensitivity concerning health and safety risks (n = 83)

TABLE 6 Hierarchical multiple regression analysis of the factors that were related to the outcomes for facilitators as gaining better-than-expected results based on developing relationships with workers (n = 83)

| | Model 1 | | Model 2 | | Model 3 | |
|--|---------|----------|---------|----------|---------|----------|
| | β | <i>P</i> | β | <i>P</i> | β | <i>P</i> |
| Background of the participants | | | | | | |
| Years of experience as a facilitator | 0.23 | 0.06 | 0.07 | 0.68 | 0.04 | 0.81 |
| Workplace social capital | 0.21 | 0.08 | 0.09 | 0.45 | 0.13 | 0.27 |
| Work environment | -0.05 | 0.66 | 0.02 | 0.88 | -0.03 | 0.80 |
| Program factors | | | | | | |
| Years for introduction the program | | 0.14 | 0.41 | 0.14 | 0.37 | |
| Involvement | | | 0.17 | 0.18 | 0.05 | 0.66 |
| Satisfaction | | | 0.24 | 0.09 | 0.10 | 0.47 |
| Number of improvements | | | 0.05 | 0.72 | -0.10 | 0.43 |
| Outcomes resulting from workplace environmental improvements | | | | | | |
| Sense of solution for OSH issues | | | | | 0.12 | 0.35 |
| Realization of creativity | | | | | 0.46 | 0.00 |
| Physical component summary | | | | | -0.08 | 0.46 |
| Adjusted R ² | 0.047 | | 0.112 | | 0.302 | |
| ΔR^2 | | | 0.065 | | 0.190 | |

it is pointed out that the outcomes by CBPR were closely associated with changes of awareness, such as changes in participants' motivation and recognition, and the outcome for capacity building. The present study showed that participatory programs led to the same outcomes as those for CBPR.

4.2 | Factors related to the impact for the facilitators' outcomes

The result of a hierarchical multiple regression analysis indicated that the outcomes for facilitators were significantly associated with the facilitators' involvement in the program factors and two factors relevant to the outcomes for the workplace environment improvement such as sense of solution for OSH issues and realization of creativity. These findings are consistent with the previous papers that also confirmed the roles of the participatory approach in supporting participants' empowerment^{21,23} and productivity increase.^{11,31} However, the results of the present study are important as they emphasize the facilitators' outcomes as key elements in the participatory workplace environment improvement programs.

Kolb proposed the Experiential Learning Model^{32,33} indicating that people would learn best through experience. Kolb's effective learning model is seen relevant when a person progresses through a cycle of four stages: (a) having a concrete experience; (b) observation of and reflection on that experience; (c) formation of abstract concepts

and conclusions; and (d) use of these stages for testing the hypothesis in future situations.³³ The work improvement program is a learning process through subsequent improvement activities. Therefore, facilitators taking part in the program could accumulate experience by active involvement, which should make it possible to promote growth and confidence as facilitators in the experiential learning cycle. It might be that even if the number of years experience as facilitators are short, their active participation in workplace environment improvement could increase the facilitators' outcomes. In the process of a participatory workplace environment improvement program, adequate support systems might be required to enhance facilitators' involvement and promote positive learning.

Moreover, "sense of solution for OSH issues" in outcomes resulting from workplace environmental improvements was associated with "knowing practical ways and strategies to ensure full participation." An increased sense of solving the problem that a safer and healthier workplace was realized by improving the workplace environment may be mentioned as a successful experience for the facilitators. Through these successful experiences, the facilitators may be able to enhance self-efficacy, and there is a possibility that their awareness of the need to continue the participatory workplace environment improvement program is enhanced. Bandura shows resilience relevant to self-efficacy as follows; mastery experiences, vicarious experiences, verbal persuasion, and emotional and

physiological states.³⁴ The successful experiences of workplace environment improvement activities undertaken with workers' initiative may incorporate various experiences such as sharing good practices at each workplace and small group discussions repeated while emphasizing a positive attitude³⁵ as verbal persuasion. Such experiences also include many elements that may enhance self-efficacy in the process of the workplace environment improvement program. It has been suggested that the facilitators' outcomes promote the outcomes for the workplace environment improvement program, and that devising various strategies for continuing activities could be strengthened by the sense of solutions and success experiences of workplace environment improvement. It is important that these outcomes could also contribute to productivity increase.

4.3 | Limitations of the study

This study has several limitations. First, this study was a cross-sectional study with a small number of participants and industry settings. It was difficult to explain the cause-and-effect relationships among the variables and temporal changes of the examined conditions. It appears necessary to analyze the effect of experiences years of facilitators and the differences among well experienced and less experienced facilitators. Second, all the outcomes in this study were measured by self-reporting, which may be affected by the perception of the participants. Third, the workplaces of this study were conducting the study-related processes in a relatively short term after introducing these programs. Since the participatory workplace environment improvement programs emphasize continuous activities as a step-by-step approach, it is necessary to further conduct research for the long-term outcomes with comprehensive viewpoints of program evaluation.

5 | CONCLUSIONS

In this present study, the outcomes for facilitators consisted of the following: “knowing practical ways and strategies to ensure full participation,” “building confidence and self-development,” “improving safety and health-risk sensitivity,” and “gaining better-than-expected results based on developing relationships with workers.” The outcomes for facilitators were significantly associated with years of experiences as a facilitator, facilitators' involvement, the sense of solution for OSH issues, and realization of creativity. It is suggested that the role of a facilitator dynamically changes through a participatory work improvement program as a key person in the workplace. Supporting acting facilitators' initiatives in the process of participatory programs, as well as promoting the active involvement of workers and managers were considered useful for effective implementation workplace environment improvement programs.

ACKNOWLEDGMENTS

This study was a part of thesis work in Ph.D. degree by graduate school of nursing Sciences, St. Luke's international university. The author would like to thank all participants in this study. This work was supported by JSPS KAKENHI Grant Number 23593197.

DISCLOSURE

Approval of the research protocol: The Research Ethics Review Board of the St. Luke International University approved the study procedures (No.13-042). *Informed consent:* The aims and procedures of this study were explained in the questionnaire and consent was obtained from each participant when completing the questionnaire. *Registry and the registration no. of the study/trial:* N/A. *Animal studies:* N/A. *Conflict of interest:* The authors declare that there are no conflict of interest.

AUTHOR CONTRIBUTIONS

E.Y. and K.K. conceived the ideas and led the writing; E.Y. collected and analyzed the data.

ORCID

Etsuko Yoshikawa  <https://orcid.org/0000-0002-7473-3093>

REFERENCES

1. Kogi K. Participatory methods effective for ergonomic workplace improvement. *Appl Ergon.* 2006;37:547-554.
2. Yoshikawa E. Concept analysis of a participatory approach to occupational safety and health. *Sangyo Eiseigaku Zasshi.* 2013;55:45-52. (in Japanese).
3. Ikeda T, Nakata A. Participatory work improvement in small workplaces: a systematic review and Japanese future task. *Sangyo Igaku Review.* 2012;25:115-125. (in Japanese).
4. Montano D, Hoven H, Siegrist J. Effects of organisational-level interventions at work on employees' health: a systematic review. *BMC Public Health.* 2014;14:135.
5. Kogi K. Work improvement and occupational safety and health management systems: common features and research needs. *Ind Health.* 2002;40:121-133.
6. Udo H, Kobayashi M, Udo A, Branlund B. Participatory ergonomic improvement in nursing home. *Ind Health.* 2006;44:128-134.
7. Itani T, Tachi N, Takeyama H, et al. Approaches to occupational health based on participatory methodology in small workplaces. *Ind Health.* 2006;44:17-21.
8. Kobayashi Y, Kaneyoshi A, Yokota A, Kawakami N. Effects of a worker participatory program for improving work environments on job stressors and mental health among workers: a controlled trial. *J Occup Health.* 2008;50:455-470.
9. Rivilis I, Van Eerd D, Cullen K, et al. Effectiveness of participatory ergonomic interventions on health outcomes: a systematic review. *Appl Ergon.* 2008;39:342-358.

10. Pehkonen I, Takala E-P, Ketola R, et al. Evaluation of a participatory ergonomic intervention process in kitchen work. *Appl Ergon*. 2009;40:115-123.
11. Tsutsumi A, Nagami M, Yoshikawa T, Kogi K, Kawakami N. Participatory intervention for workplace improvements on mental health and job performance among blue-collar workers: a cluster randomized controlled trial. *J Occup Environ Med*. 2009;51.
12. Hisamune S, Kogi K. Findings of the work improvement on board (WIB) programme by the fishery agency in Japan. *Int Marit Health*. 2015;66:152-159.
13. Kawakami T. Participatory training to improve safety and health in small construction sites in some countries in Asia: development and application of the WISCON training program. *New Solut*. 2016;26:208-219.
14. Kim J-S, Yoon S-Y, Cho S-Y, Kim S-K, Chung I-S, Shin H-S. Effectiveness of participatory training for the promotion of work-related health and safety among Korean farmers. *Ind Health*. 2017;55:391-401.
15. Wallerstein N, Duran B. *The theoretical, historical and practice roots of CBPR*. In Community based participatory research for health: Advancing social and health equity. San Francisco, CA: Jossey-bass; 2017.
16. Sakai M, Miyazaki T, Asahara K, et al. Literature review for Community-based participatory research. *Kango Kenkyu*. 2006;39:121-134. (in Japanese).
17. Khai TT, Kawakami T, Kogi K. *Participatory action oriented training: PAOT programme trainer's manual*. Cantho, Vietnam: Centre for Occupational Health and Environment; 2005.
18. Kawakami T. Networking grassroots efforts to improve safety and health in informal economy workplaces in Asia. *Ind Health*. 2006;44:42-47.
19. Kogi K. Practical ways to facilitate ergonomics improvements in occupational health practice. *Hum Factors*. 2012;54:890-900.
20. Kogi K. Roles of participatory action-oriented programs in promoting safety and health at work. *Saf Health Work*. 2012;3:155-165.
21. Kim Y-H, Yoshikawa E, Yoshikawa T, Kogi K, Jung M-H. Utility of action checklists as a consensus building tool. *Ind Health*. 2015;53:85-94.
22. Nishikido N, Matsuda K, Fukuda E, et al. Development and process evaluation of the participatory and action-oriented empowerment model facilitated by occupational health nurses for workplace health promotion in small and medium-sized enterprises. *Ind Health*. 2007;45:62-73.
23. Yoshikawa E. An outcomes index for workplace environmental improvement using a participatory approach. *Roudou Kagaku*. 2013;89:40-55. (in Japanese).
24. Gorsuch RL. *Factor analysis*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1983.
25. Cattell RB. *The scientific use of factor analysis in behavioral and life sciences*. New York: Plenum Press; 1978.
26. Everitt BS. Multivariate analysis: the need for data, and other problems. *Brit J Psychiat*. 1975;126(3):237-240.
27. Hair J, Andreson R, Tatham R, et al. *Multivariate data analysis*, 5th (ed). Upper Saddle River, NJ: Prentice-Hall Inc; 1998.
28. Inoue A, Kawakami N, Shimomitsu T, et al. Development of a short questionnaire to measure an extended set of job demands, job resources, and positive health outcomes: the new brief job stress questionnaire. *Ind Health*. 2014;52:175-189.
29. Fukuhara S, Suzukamo Y. *SF-8 Manuals Japanese Version*. Kyoto, Japan: iHope International; 2004. (in Japanese).
30. Israel BA, Schulz AJ, Parker EA, et al. *Critical issues in developing and following community-based participatory research principles*. Community-based participatory research for health. San Francisco, CA: Jossey-Bass; 2008.
31. Vink P, Koningsveld EA, Molenbroek JF. Positive outcomes of participatory ergonomics in terms of greater comfort and higher productivity. *Appl Ergon*. 2006;37:537-546.
32. Kolb DA. *Experiential learning: Experience as the source of learning and development*. Upper Saddle River, NJ: FT press; 2014.
33. Kolb DA, Fry RE. *Toward an applied theory of experiential learning*. Cambridge: MIT Alfred P. Sloan School of Management; 1974.
34. Bandura A. Self-efficacy mechanism in human agency. *Am Psychol*. 1982;37:122.
35. Uchiyama A, Odagiri Y, Ohya Y, Takamiya T, Inoue S, Shimomitsu T. Effect on mental health of a participatory intervention to improve psychosocial work environment: a cluster randomized controlled trial among nurses. *J Occup Health*. 2013;55:173-183.

How to cite this article: Yoshikawa E, Kogi K. Outcomes for facilitators of workplace environment improvement applying a participatory approach. *J Occup Health*. 2019;61:415–425. <https://doi.org/10.1002/1348-9585.12065>