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Association of visualizing the pathway from health investment to goal attainment with subsequent changes in elements required for effective workplace health promotion: a longitudinal study

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Abstract

Objectives

To examine whether development of a strategy map within Japan's Health and Productivity Management (HPM) framework is associated with changes in organizational elements required for effective workplace health promotion (WHP), and whether these associations differ by corporation size.

Methods

We conducted a longitudinal study using data from the 2021–2023 HPM Surveys. The study included 1,087 corporations that had participated in the 2021 survey and had not developed a strategy map at baseline. The explanatory variable was whether a corporation had diagrammed a strategy map in the 2022 survey. Outcomes were deviation scores in four areas of the 2023 HPM Survey Sheet: "positioning of HPM in the corporation's philosophy and policies," "organized frameworks," "specific systems for implementing HPM," and "assessment and improvement." Multiple regression analyses were performed adjusting for industry sector, corporation size, number of employees, and the 2021 overall score. To assess differences by corporation size, an interaction term between strategy-map status and number of employees was included.

Results

Corporations with strategy maps showed higher scores in all four areas. After adjustment for baseline overall score, positive associations remained. The association tended to be weaker in larger corporations, with a significant interaction for "organized frameworks" and similar negative trends for "specific systems for implementing HPM" and "assessment and improvement."

Conclusions

Strategy map development was longitudinally associated with higher evaluations across all four areas, suggesting that visualizing the pathway from health investment to goal attainment may support organizational elements of effective WHP. Its association may differ by corporation size.

Introduction

Workplace health promotion (WHP) programs have been widely implemented in many countries with the aim of maintaining a healthy workforce and improving worker well-being and organizational performance. For WHP programs to achieve meaningful outcomes, multiple elements are required, including leadership with top management involvement, well-developed implementation structures, the provision of appropriate programs, and mechanisms that support a continuous plan–do–check–act (PDCA) cycle of evaluation and improvement. Previous studies have likewise shown that, even when similar WHP programs are introduced, some organizations achieve favorable outcomes whereas others do not,[1] and that multiple organizational factors—such as leadership, organizational preparedness, and systems for evaluation and improvement—play important roles in explaining these differences.[2,3] Accordingly, the development of more mature WHP programs that incorporate these success-related elements is considered important for enhancing program effectiveness.

To assess the maturity of WHP while considering these elements required for success, several countries have developed structured evaluation frameworks. In the United States, the Health Enhancement Research Organization (HERO) Scorecard evaluates programs across six sections: strategic planning, organizational and cultural support,

programs, program integration, engagement strategies, and measurement and evaluation.[4] In addition, the American College of Occupational and Environmental Medicine (ACOEM) Excellence in Corporate Health Achievement Award (eCHAA) organizes its evaluation criteria into four components: (I) program description, (II) program dissemination, (III) outcome measurement, and (IV) trend analysis.[5] In Japan, against the backdrop of an aging workforce, the government has promoted Health and Productivity Management (HPM). Under this national initiative, participating corporations complete a self-administered HPM Survey Sheet, based on which they may be selected for the Health and Productivity Stock Selection or certified under the Certified Health & Productivity Management Outstanding Organizations Recognition Program.[6] This survey sheet incorporates key elements required for WHP effectiveness and based on expert input and best practices, consists of approximately 80 items categorized into four areas: “positioning of HPM in the corporation's philosophy and policies,” “organized frameworks,” “specific systems for implementing HPM,” and “assessment and improvement.”

Within the Japanese HPM framework, considerable emphasis is placed on identifying the managerial issues a corporation seeks to address, specifying the employee health issues linked to those managerial goals, clarifying the intended objectives, and strategically visualizing the pathway through which those objectives are to be achieved. As a concrete method for doing so, corporations are encouraged to develop a “strategy map,” which is based on the organization’s management and health promotion policies and consists of employee health issues, health promotion initiatives, key performance indicators (KPIs), and key goal indicators (KGIs). In June 2020, the Ministry of Economy, Trade and Industry issued the Health Investment Management Accounting Guidelines, which explicitly recommended the development of such strategy maps, providing an additional policy impetus for corporations to adopt this approach. By developing a strategy map, corporations are expected to make visible the process through which health investments lead to outcomes and to clarify the strategic narrative linking health investment to organizational results. This concept is described in the revised HPM Guidebook published in March 2025 and has been widely referenced by corporations seeking HPM certification.[7] In addition, within the HPM Survey itself, the development and internal/external disclosure of a strategy map are emphasized as important evaluation items, and in practice, an increasing number of corporations have developed and disclosed such maps.

However, it remains insufficiently understood how visualizing the pathway to goal attainment influences the elements required for WHP to be effective. Given its constituent components, such visualization would be expected to contribute to the strengthening of programs and the promotion of the PDCA cycle. In this sense, it is likely to be directly related to the areas of “specific systems for implementing HPM” and “assessment and improvement” in the Japanese HPM Survey Sheet. At the same time, it may also positively influence the foundational areas of “positioning of HPM in the corporation's philosophy and policies” and “organized frameworks,” insofar as it can serve as a communication tool that clarifies the objectives of health investment and helps build shared understanding among senior management and other stakeholders.

Corporation size is directly related to the number of layers in decision-making. In the context of HPM implementation, smaller organizations generally have fewer hierarchical layers, fewer steps between problem recognition and decision-making, and fewer opportunities required for decisions to be disseminated throughout the organization. Because the PDCA cycle may therefore be easier to operate over a shorter period in smaller organizations, the influence of visualizing the pathway to goal attainment on the elements required for effective WHP may be more pronounced in such settings.

Accordingly, the present study aimed to clarify the relationship between visualizing the pathway from health investment to goal attainment and subsequent changes in the elements required for effective WHP. Specifically, using the Japanese HPM framework, we longitudinally examined the association between the development of a “strategy

map" and evaluation scores across the four areas of the HPM Survey Sheet— "positioning of HPM in the corporation's philosophy and policies," "organized frameworks," "specific systems for implementing HPM," and "assessment and improvement." We also examined whether this association differed according to corporation size.

Methods

This study used longitudinal data from the 2021, 2022, and 2023 HPM Surveys and was conducted within the context of Japan's HPM recognition programs. Details of the questionnaire design and survey contents have been reported elsewhere.[6] The surveys are organized by the Ministry of Economy, Trade and Industry (METI), which invites corporations to participate through an open call rather than by directly recruiting individual companies. Corporations that choose to participate access the self-administered HPM Survey Sheet on the METI website, complete it, and return it to METI. The questionnaire is primarily intended for the corporate officer responsible for employee health maintenance and promotion, usually in the Human Resources or Labor Relations division, and respondents are instructed to consult senior management, health insurers, and other relevant stakeholders when necessary. Submitted responses are used in the evaluation process for the HPM Stock Selection and the Certified HPM Corporation Recognition Program for large corporations. For the present study, the HPM Survey Sheet data were provided by METI after completion of a formal research application procedure.

We targeted 2,869 corporations that participated in the HPM Survey in 2021. To focus on incident adoption effects, we excluded corporations that already had a strategy map at HPM Survey in 2021 (n = 1,583). After excluding those corporations, 1,286 corporations remained eligible. At follow-up, 199 corporations had no recorded responses and were excluded from the analysis. We finally included 1,087 corporations in our analysis. Figure 1 illustrates the flow of this study.

2.1 Explanatory variables

The explanatory variable was whether the corporation had diagrammed a strategy map within the HPM framework in the 2022 survey. This variable was assessed using a specific survey question. The question asked: "Regarding the management issues you wish to address through Health and Productivity Management (HPM), have you organized the expected effects and the specific initiatives, and clarified how they are connected?" Respondents selected one of the following seven options: Understanding of the linkage between management issues to be addressed through health management and expected outcomes; Understanding of the linkage between management issues to be addressed through health management and specific initiatives; Understanding of the linkage between expected outcomes and specific initiatives; Understanding of the linkage among management issues, expected outcomes, and specific initiatives as a coherent sequence; Diagrammatic representation of the linkage among management issues, expected outcomes, and specific initiatives; Public disclosure of a diagrammatic representation of the linkage; and No systematic organization of the linkage. Responses were classified as "corporations with diagrammed strategy maps" if respondents selected "Diagrammatic representation of the linkage among management issues, expected outcomes, and specific initiatives" or "Public disclosure of a diagrammatic representation of the linkage," and all other selections indicated "corporations without diagrammed strategy maps."

2.2 Outcome variables

In the HPM recognition programs, evaluation of corporate health promotion performance is based on deviation scores in four areas: "positioning of HPM in the corporation's philosophy and policies," "organized frameworks," "specific systems for implementing HPM," and "assessment and improvement." The overall score for each corporation is calculated as a weighted sum of these four area scores, using weights of 3:2:2:3. In the present study,

we used the deviation scores from the 2023 HPM Survey as outcome variables. For the analysis, we treated the deviation scores for the four areas as separate outcome variables to examine domain-specific associations.

2.3 Other variables

Covariates were industry sector, corporation size, employee count, and the overall score from the 2021 survey. Industry was reported in the HPM Survey Sheet according to the classification system of the Securities Identification Code Committee in Japan and was then regrouped into 12 categories based on the International Standard Industrial Classification[8]: agriculture, forestry, fishing, and mining; construction; manufacturing; electricity, gas, heat supply, and water; transport and postal activities; information and communications; wholesale and retail trade; finance and insurance; real estate and goods rental and leasing; medical, health care, and welfare; services; and others. Industry categories with no corporations (n = 0) were excluded from the analysis, resulting in a total of 8 industry categories being included. Corporation size was defined in five groups according to the number of full-time employees: <100, 100–299, 300–999, 1,000–2,999, and ≥ 3,000. For the assessment of effect modification by corporation size, employee count was log-transformed using the natural logarithm and entered the interaction model with strategy-map status as a continuous variable. The 2021 overall score was also handled as a continuous variable.

2.4 Statistical analysis

Multiple regression analysis was conducted to examine the association between whether the corporation had diagrammed a strategy map and deviation scores in four areas. For the primary analysis (Table 2), we estimated the main association between strategy-map status and each outcome. Model 1 was adjusted for industry sector and corporation size, and Model 2 was additionally adjusted for the overall score in the 2021 survey.

To examine whether this association differed according to corporation size (Table 3), we conducted a separate set of models including the number of employees and an interaction term. In this analysis, employee count was entered as a natural log–transformed continuous variable. Model 1 was adjusted for industry sector and the 2021 overall score; Model 2 additionally adjusted for the number of employees; and Model 3 further included an interaction term between strategy-map status and the natural log–transformed number of employees. A p-value < 0.05 was considered to indicate statistical significance. All analyses were performed using Stata statistical software (Release 19.5, Stata Corp LLC, College Station, TX, USA).

2.5 Ethical considerations

This study did not use any personal information. The dataset was anonymized at the corporation level and was provided by the Ministry of Economy, Trade and Industry (METI) through a formal research application process. Under Chap. 1, Article 3 of Japan's "Ethical Guidelines for Medical and Health Research Involving Human Subjects," studies using only existing information that does not include personal data are outside the scope of the guidelines. Accordingly, this study was exempt from ethical review, and institutional IRB review or consultation was not required.

Results

Table 1 shows the characteristics of participating corporations, categorized by whether the corporation had diagrammed a strategy map. Among the 1,087 corporations, 791 (73%) were classified as "corporations without diagrammed strategy maps", and 296 (27%) as "corporations with diagrammed strategy maps". The most common industry sector was manufacturing (n = 451), followed by wholesale and retail trade (n = 252). The most frequent

corporation size category was 300–999 employees (n = 412). The mean (SD) overall score in the 2021 survey was 48.8 (5.5) in the non-diagrammed group and 51.7 (6.1) in the diagrammed group.

Table 1
Characteristics of participating corporations

	Diagrammed strategy map	
	No	**Yes**
Total	791(72.8%)	296(27.2%)
Industry sector		
Manufacturing	320(40.5%)	131(44.3%)
Electricity, gas, heat supply, and water	4(0.5%)	3(1.0%)
Transport and postal activities	31(3.9%)	8(2.7%)
Information and communications	92(11.6%)	46(15.5%)
Wholesale and retail trade	203(25.7%)	49(16.6%)
Finance and insurance	34(4.3%)	18(6.1%)
Real estate and goods rental and leasing	14(1.8%)	5(1.7%)
Services	93(11.8%)	36(12.2%)
Corporation size		
≤ 99	45(5.7%)	7(2.3%)
100–299	208(26.3%)	36(12.2%)
300–999	310(39.2%)	102(34.5%)
1,000–2,999	172(21.7%)	85(28.7%)
≥ 3,000	56(7.1%)	66(22.3%)
Overall score in the 2021 survey (mean (SD))	48.8(5.5)	51.7(6.1)

Table 2 shows the association between whether the corporation had diagrammed a strategy map and deviation scores in four areas of the Health and Productivity Management Survey. Compared with corporations without diagrammed strategy maps, corporations with diagrammed strategy maps showed significantly higher deviation scores across all four areas in both models. In Model 1 (adjusted for industry sector and corporation size), the diagrammed strategy map group had higher scores for “positioning of HPM in the corporation’s philosophy and policies” (coefficient: 6.74, 95% CI: 5.91 to 7.57, $p < 0.001$), “organized frameworks” (coefficient: 5.25, 95% CI: 4.33 to 6.16, $p < 0.001$), “specific systems for implementing HPM” (coefficient: 4.71, 95% CI: 3.75 to 5.67, $p < 0.001$), and “assessment and improvement” (coefficient: 4.10, 95% CI: 3.32 to 4.87, $p < 0.001$)

Table 2
Association whether the corporation had diagrammed a strategy map and deviation scores in four areas in the Health and Productivity Management Survey

Outcome		Model 1			Model 2		
	Variable	B†	95% CI	P value	B†	95% CI	P value
Positioning of HPM in the corporation's philosophy and policies	Diagrammed strategy map (Yes vs No [reference])	6.74	5.91 to 7.57	< 0.001	5.39	4.67 to 6.11	< 0.001
Organized frameworks	Diagrammed strategy map (Yes vs No [reference])	5.25	4.33 to 6.16	< 0.001	3.32	2.62 to 4.01	< 0.001
Specific systems for implementing HPM	Diagrammed strategy map (Yes vs No [reference])	4.71	3.75 to 5.67	< 0.001	2.76	2.07 to 3.44	< 0.001
Assessment and improvement	Diagrammed strategy map (Yes vs No [reference])	4.10	3.32 to 4.87	< 0.001	2.50	1.86 to 3.15	< 0.001
B†: Unstandardized coefficient							
CI: confidence interval							

HPM: Health and Productivity Management.

Model 1: Adjusted for industry sector, corporation size

Model 2: Model 1, Additionally adjusted for overall score in the 2021 survey

In Model 2, which additionally adjusted for the overall score in the 2021 survey, these positive associations remained statistically significant but were attenuated: “positioning of HPM in the corporation’s philosophy and policies” (coefficient: 5.39, 95% CI: 4.67 to 6.11, $p < 0.001$), “organized frameworks” (coefficient: 3.32, 95% CI: 2.62 to 4.01, $p < 0.001$), “specific systems for implementing HPM” (coefficient: 2.76, 95% CI: 2.07 to 3.44, $p < 0.001$), and “assessment and improvement” (coefficient: 2.50, 95% CI: 1.86 to 3.15, $p < 0.001$).

Table 3 presents the models incorporating the number of employees and the interaction term between strategy-map status and the number of employees. In Model 3, the interaction term was statistically significant for “organized frameworks” (coefficient: −0.60, 95% CI: −1.11 to − 0.10, $p = 0.020$), suggesting that the association between diagramming a strategy map and the deviation score for organized frameworks attenuated as corporation size increased. For other three areas, the interaction terms were not statistically significant. However, the findings suggested a trend for "specific systems for implementing HPM" (coefficient: -0.49, 95% CI: −1.01 to 0.03, $p = 0.060$) and "assessment and improvement" (coefficient: -0.54, 95% CI: −1.07 to 0.00, $p = 0.050$).

Table 3
Association whether the corporation had diagrammed a strategy map and deviation scores in four areas, and the interaction term with number of employees

Outcome	Variable	Model 1			Model 2			Model 3		
		B†	95% CI	P value	B†	95% CI	P value	B†	95% CI	P value
Positioning of HPM in the corporation's philosophy and policies	**Diagrammed strategy map** (Yes vs No [reference])	5.74	5.02 to 6.47	< 0.001	5.35	4.63 to 6.08	< 0.001	6.71	3.03 to 10.39	< 0.001
	Number of employees				0.70	0.46 to 0.95	< 0.001	0.77	0.51 to 1.03	< 0.001
	Interaction term									
	Strategy map × Number of employees‡							-0.20	-0.73 to 0.33	0.450
Organized frameworks	**Diagrammed strategy map** (Yes vs No [reference])	3.84	3.13 to 4.54	< 0.001	3.27	2.58 to 3.97	< 0.001	7.35	3.84 to 10.87	< 0.001
	Number of employees				1.03	0.76 to 1.30	< 0.001	1.22	0.91 to 1.53	< 0.001
	Interaction term									
	Strategy map × Number of employees‡							-0.60	-1.11 to -0.10	0.020
Specific systems for implementing HPM	**Diagrammed strategy map** (Yes vs No [reference])	3.11	2.43 to 3.80	< 0.001	2.74	2.06 to 3.42	< 0.001	6.06	2.43 to 9.70	0.001
	Number of employees				0.69	0.42 to 0.95	< 0.001	0.84	0.56 to 1.13	< 0.001
	Interaction term									

	Strategy map × Number of employees‡							-0.49	-1.01 to 0.03	0.060
Assessment and improvement	**Diagrammed strategy map** (Yes vs No [reference])	2.77	2.14 to 3.41	< 0.001	2.52	1.87 to 3.17	< 0.001	6.14	2.32 to 9.96	0.002
	Number of employees				0.46	0.15 to 0.76	0.004	0.62	0.25 to 1.00	< 0.001
	Interaction term									
	Strategy map × Number of employees‡							-0.54	-1.07 to 0.00	0.050

B†: Unstandardized coefficient

‡: Employees were natural log–transformed; the interaction term was strategy map × ln(employees)

CI: confidence interval

HPM: Health and Productivity Management.

Model 1: Adjusted for industry, and overall score in the 2021 survey

Model 2: Model 1, Additionally adjusted for number of employees

Model 3: Model 2, Additionally adjusted for interaction term of whether the corporation had diagrammed a strategy map and number of employees

Discussion

In this study, we restricted the analysis to corporations that had not developed a strategy map in 2021 and longitudinally examined the association between subsequent strategy map development in 2022 and standardized scores in the four areas of the 2023 HPM Survey Sheet: “positioning of HPM in the corporation's philosophy and policies,” “organized frameworks,” “specific systems for implementing HPM,” and “assessment and improvement.” We found that strategy map development was consistently associated with higher standardized scores across all four areas. Although the associations were attenuated after additional adjustment for the 2021 overall score, they remained statistically significant. Furthermore, regarding effect modification by corporation size, a significant negative interaction was observed for “organized frameworks,” and negative interaction trends were also observed for “specific systems for implementing HPM” and “assessment and improvement,” whereas no clear interaction was observed for “positioning of HPM in the corporation's philosophy and policies.”

The finding that strategy map development was associated with all four areas of the HPM Survey Sheet suggests that visualizing the pathway from health investment to goal attainment may be associated with multiple elements required for WHP to be effective. By developing a strategy map, corporations can clarify, based on their management and health promotion policies, employee health issues, health promotion initiatives aimed at addressing those issues, KPIs used to assess the implementation and effectiveness of those initiatives, and KGIs representing the ultimate goals related to improvement in the underlying health issues and organizational outcomes.[7] In other words, a strategy map functions as a framework that makes explicit the relationships among issues, initiatives, evaluation indicators, and target outcomes in health investment, thereby facilitating organizational shared understanding of which initiatives should be implemented for which issues, in what order of priority, and by which indicators their outcomes should be evaluated. Through such structuring, decisions regarding intervention selection and resource allocation may become easier, while the foundation for role clarification and progress monitoring across responsible departments and stakeholders may also be strengthened, thereby promoting implementation as well as continuous evaluation and improvement. These mechanisms correspond closely to the content of the areas “specific systems for implementing HPM” and “assessment and improvement,” and, in fact, in the present study, visualizing the pathway was associated with higher standardized scores in these areas. In addition, because strategy map development involves verbalizing and diagramming the objectives and logic of health investment, its use as a communication tool may support consensus building among senior management and stakeholders, thereby contributing to its association with “positioning of HPM in the corporation's philosophy and policies.” Likewise, as it functions as a communication tool, it may also facilitate the clarification of responsibilities, the establishment of meeting structures, and cross-departmental coordination, which may explain its association with “organized frameworks.” At the same time, corporations capable of developing a strategy map may already have a certain degree of organizational preparedness in place; therefore, the associations observed in this study should be interpreted with caution.

Regarding effect modification by corporation size, the negative interaction was significant for “organized frameworks.” This finding suggests that the association between strategy map development and domain scores may weaken as corporation size increases. Larger firms tend to have more hierarchical structures, more formalized management systems, and a greater number of departments[9,10], resulting in multiple target populations and health issues; therefore, translating initiatives outlined in the strategy map into on-site implementation may require more time. In addition, feedback opportunities related to KPIs and KGIs may become more complex, making it less likely that changes will be reflected in survey-based evaluations in the short term. In contrast, in smaller corporations, fewer decision-making layers may allow consensus building, implementation, and feedback to proceed through relatively shorter cycles, making the effects of strategy map development more likely to be reflected in domain scores. The same mechanism may also help explain the negative interaction trends observed for “specific systems for implementing HPM” and “assessment and improvement.” By contrast, no interaction was observed for “positioning of HPM in the corporation's philosophy and policies,” and the association did not clearly differ by corporation size. One possible explanation is that this domain includes not only policy statements and KGIs, but also elements related to internal and external disclosure and dissemination. Disclosure of occupational health information to external stakeholders has been reported to be more advanced among larger corporations,[11] whereas smaller corporations may be more likely to have limited disclosure due to constraints in human resources and organizational capacity. Particularly in smaller corporations, even when a strategy map has been developed, human resources and organizational capacity for adequately disseminating and disclosing its content may be limited; as a result, changes attributable to strategy map development may not directly translate into higher evaluations in this domain. Consequently, the size-related differences suggested in the other areas may have been less likely to appear as a clear interaction for “positioning of HPM in the corporation's philosophy and policies.” In addition, this domain may be more strongly influenced by factors other than corporation size, such as the degree of top management involvement.

These findings provide practical implications for the design and implementation of WHP. Because strategy map development was longitudinally associated with all four areas, visualizing the pathway of health investment may be related not only to directly operational areas but also to foundational components of WHP, including corporate philosophy/policy alignment and implementation structures. Furthermore, because the strength of these associations may differ by corporation size, considerations tailored to corporation size may be important for the effective use of strategy maps. In small and medium-sized corporations, visualizing the pathway from health investment to goal attainment may be more readily linked to the development of shared understanding among stakeholders and to the strengthening of implementation structures, supporting the promotion of strategy map development. However, appropriate strategy map development requires a certain level of competence in problem identification, prioritization of initiatives, KPI/KGI design, and data utilization; therefore, for small and medium-sized corporations with limited human and time resources, both development and operation may be challenging. In such settings, leveraging part-time occupational health professionals and other external resources may be useful for reducing the burden of development and operation while maintaining quality. In large corporations, by contrast, the complexity of organizational structures may make changes resulting from strategy map development less readily observable and may require a longer period before such changes are reflected in outcomes. Accordingly, even if short-term effects are not immediately evident, large corporations may benefit from aiming for long-term operational embedding and gradual reflection in evaluation indicators by using the strategy map as a common language to promote management understanding, while also establishing and refining monitoring frameworks based on KPIs and KGIs.

This study has several strengths. First, by using annual data from the same corporations, we temporally separated the explanatory variable from the outcomes and examined their association longitudinally. Second, by restricting the sample to corporations that had not developed a strategy map in 2021, we were able to focus specifically on newly developed strategy maps. Third, by adjusting for the 2021 overall score, we were able to account, to some extent, for preexisting differences between corporations before strategy map development.

This study also has several limitations. First, as an observational study, it cannot rule out unmeasured confounding. For example, factors such as the level of top management commitment to health promotion, organizational culture or readiness, the availability of occupational health resources (e.g., in-house staff or external experts), and the maturity of prior health promotion activities may have influenced both the likelihood of developing a strategy map and the evaluation scores. Second, because the HPM Survey Sheet is self-administered, reporting bias is possible. Third, because the analysis was limited to corporations participating in the HPM Survey, the generalizability of the findings may be limited. Fourth, although the interaction was significant for “organized frameworks,” the interactions for “specific systems for implementing HPM” and “assessment and improvement” were only borderline. Because the statistical power to detect interaction effects is generally lower than that for main effects and often requires much larger sample sizes, the non-significant interaction terms in some areas should be interpreted cautiously. Future research should move beyond the mere presence or absence of strategy map development and examine the quality and operational use of strategy maps, as well as the implementation processes through which they may contribute to improvements in the four areas across organizations of different sizes.

Conclusion

Strategy map development was longitudinally associated with higher evaluations across all four areas of the HPM Survey Sheet, suggesting that visualizing the pathway may be associated with multiple elements that constitute the maturity of WHP. Because the strength of these associations may differ according to corporation size, it may be important to design implementation support tailored to organizational scale.

Declarations

Ethics approval and consent to participate: Not applicable

Consent for publication: Not applicable

Availability of data and materials:

The dataset(s) supporting the conclusions of this article are available from the Ministry of Economy, Trade and Industry (METI) repository (https://www.meti.go.jp/policy/mono_info_service/healthcare/kenko_keiei.html). Restrictions apply to the availability of these data, which were used under license for this study. The data is available with the permission of METI.

Competing interests: The authors declare that they have no competing interests

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Authors' contributions:

Tomohisa Nagata and Koji Mori conceived and designed the study. Tomohisa Nagata acquired the data. Yuki Kumakawa designed the analysis, analyzed and interpreted the data, and drafted the manuscript. All authors contributed to the interpretation of the data, critically revised the manuscript for important intellectual content, approved the final version to be published, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Figures

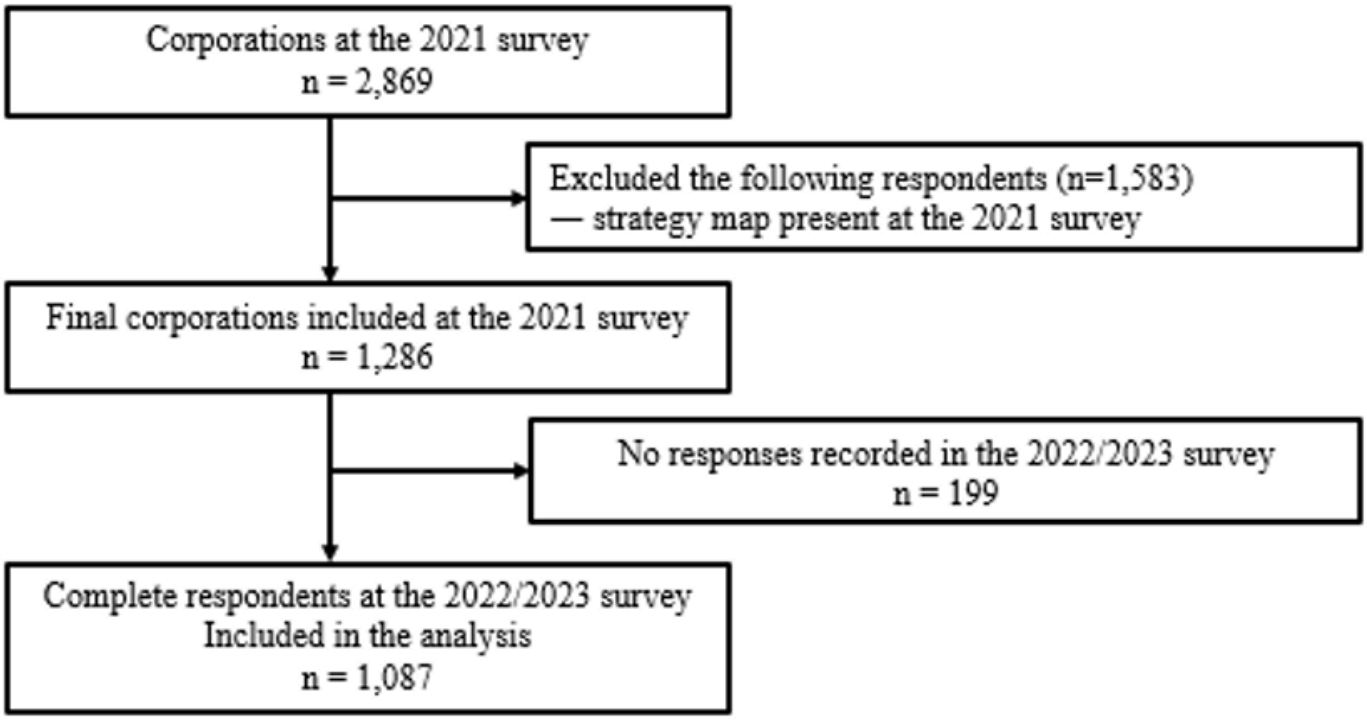


Figure 1

The flow of this study