# Supplementary Materials

### *1. The SAA Analysis*

The first adoption step is to improve those aspects (i.e., skill and practice (SP) and concept and evaluation (CE)) falling into the third quadrant (L, L), indicating the low satisfaction index and low attention index. The second adoption step is to enhance those aspects (i.e., communication and relationship (CR), joint information and decision making (JM)) that fall into the first quadrant (H, H), showing the high satisfaction index and high attention index, as shown in Table S1 and Figure S1.

**Table S1.** The SAA analysis of the competence assessment.

| Aspects | SI | | AI | | (SI, AI) |
|---|---|---|---|---|---|
| | MS | SS | MA | SA | |
| Concept and evaluation (CE) | 7.672 | −0.518 | 7.951 | −1.039 | (L, L) |
| Skill and practice (SP) | 7.542 | −1.137 | 7.987 | −0.673 | (L, L) |
| Communication and relationship (CR) | 7.913 | 0.640 | 8.142 | 0.899 | (H, H) |
| Joint information and decision making (JM) | 7.992 | 1.015 | 8.133 | 0.813 | (H, H) |
| Average | 7.780 | 0.000 | 8.053 | 0.000 | |
| Standard deviation | 0.209 | 1.000 | 0.098 | 1.000 | |
| Maximum | 7.992 | 1.015 | 8.142 | 0.899 | |
| Minimum | 7.542 | −1.137 | 7.951 | −1.039 | |

Note 1: (H, H) means the aspect/criteria of high satisfaction and high attention, (L, H) means the aspects / criteria of low satisfaction and high attention. (L, L) means aspects/criteria of low satisfaction and low attention, and (H, L) means the aspects/criteria of high satisfaction but low attention. Note 2: MS, SS, MA, and SA means satisfaction (MS), standardized satisfaction (SS), mean attention (MA), and standardized attention (SA), respectively. Notes 3: The development strategies include four types: development strategy A (situation maintaining), development strategy B (direct strengthening), development strategy C (sequentially strengthening), and development strategy D (circumstance watching).

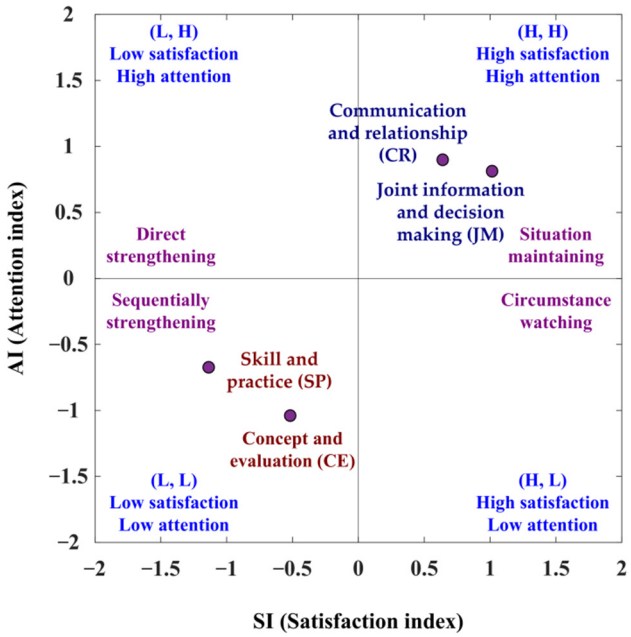



**Figure S1.** The position map based on SAA (satisfaction and attention analysis) approach.

*2. DEMATEL Approach*

The DEMATEL technique is divided into five stages in this study: (1) estimate the original average matrix, (2) compute the direct influence matrix, (3) determine the indirect influence matrix, (4) count the full influence matrix, and (5) establish the NRM graph.

(1) Estimate the original average matrix

The original average matrix is as shown in Table S2. The influence of "skill and practice (SP)" on "communication and relationship (CR)" is 2.847, i.e., "medium influence." The influence of "concept and evaluation (CE)" on "joint information and decision making (JM)" is 2.576, which also indicates "medium influence," as shown in Table S2.

**Table S2.** The original average influence matrix (A).

| Aspects | CE | SP | CR | JM | Total |
|---|---|---|---|---|---|
| Concept and evaluation (CE) | 0.000 | 2.712 | 2.720 | 2.576 | 8.008 |
| Skill and practice (SP) | 2.661 | 0.000 | 2.847 | 2.805 | 8.314 |
| Communication and relationship (CR) | 2.610 | 2.771 | 0.000 | 2.737 | 8.119 |
| Joint information and decision making (JM) | 2.568 | 2.678 | 2.797 | 0.000 | 8.042 |
| Total | 7.839 | 8.161 | 8.364 | 8.119 | - |

(2) Compute the direct influence matrix

From Equations (1) and (2), the D (direct influence matrix) can be attained by A (initial average influence matrix), as illustrated in Table S3. As shown in **T**able S4, the sum of rows and columns for "communication and relationship (CR)" is 1.971, the most critical influence aspect. On the contrary, the sum of rows and columns for "concept and evaluation (CE)" is 1.895, which is the least influential aspect.

**Table S3.** The direct influence matrix (D).

| Aspects | CE | SP | CR | JM | Total |
|---|---|---|---|---|---|
| Concept and evaluation (CE) | 0.000 | 0.324 | 0.325 | 0.308 | 0.957 |
| Skill and practice (SP) | 0.318 | 0.000 | 0.340 | 0.335 | 0.994 |
| Communication and relationship (CR) | 0.312 | 0.331 | 0.000 | 0.327 | 0.971 |
| Joint information and decision making (JM) | 0.307 | 0.320 | 0.334 | 0.000 | 0.961 |
| Total | 0.937 | 0.976 | 1.000 | 0.971 | - |

**Table S4.** The degree of direct influence.

| Aspects | Sum of row | Sum of column | Sum of row and column | Importance of influence |
|---|---|---|---|---|
| Concept and evaluation (CE) | 0.957 | 0.937 | 1.895 | 4 |
| Skill and practice (SP) | 0.994 | 0.976 | 1.970 | 2 |
| Communication and relationship (CR) | 0.971 | 1.000 | 1.971 | 1 |
| Joint information and decision making (JM) | 0.961 | 0.971 | 1.932 | 3 |

(3) Determine the indirect influence matrix

The indirect influence matrix can be obtained from Equation (3) and presented in Table S5.

**Table S5.** The indirect influence matrix (ID).

| Aspects | CE | SP | CR | JM | Total |
|---|---|---|---|---|---|
| Concept and evaluation (CE) | 7.710 | 7.867 | 8.014 | 7.845 | 31.436 |
| Skill and practice (SP) | 7.850 | 8.171 | 8.236 | 8.057 | 32.314 |
| Communication and relationship (CR) | 7.715 | 7.946 | 8.177 | 7.919 | 31.757 |
| Joint information and decision making (JM) | 7.662 | 7.894 | 8.035 | 7.943 | 31.534 |
| Total | 30.937 | 31.878 | 32.462 | 31.764 | - |

(4). Count the full influence matrix

T (full influence matrix) and the degree of full influence can be attained by Equation (4) or (5) and presented in Table S6 and Table S7, respectively. As indicated in Table S8, the communication and relationship (CR) aspect was the highest degree of total influence ($d3 + r3 = 66.188$). The concept and evaluation (CE) aspect is the highest net influence ($d1 - r1 = 0.520$). The other net influences are in the following order: the aspects of skill and practice (SP) ($d2 - r2 = 0.454$), joint information and decision making (JM) ($d4 - r4 = -0.240$), and communication and relationship (CR) ($d3 - r3 = -0.734$).

**Table S6.** The full influence matrix (T).

| Aspects | CE | SP | CR | JM | *d* |
|---|---|---|---|---|---|
| Concept and evaluation (CE) | 7.710 | 8.191 | 8.339 | 8.153 | 32.393 |
| Skill and practice (SP) | 8.168 | 8.171 | 8.576 | 8.392 | 33.307 |
| Communication and relationship (CR) | 8.027 | 8.277 | 8.177 | 8.246 | 32.727 |
| Joint information and decision making (JM) | 7.969 | 8.214 | 8.369 | 7.943 | 32.495 |
| ***r*** | 31.874 | 32.853 | 33.461 | 32.734 | - |

**Table S7.** The degree of full influence.

| Aspects | *d* | *r* | *d* + *r* | *d* – *r* |
|---|---|---|---|---|
| Concept and evaluation (CE) | 32.393 | 31.874 | 64.267 | 0.520 |
| Skill and practice (SP) | 33.307 | 32.853 | 66.159 | 0.454 |
| Communication and relationship (CR) | 32.727 | 33.461 | 66.188 | −0.734 |
| Joint information and decision making (JM) | 32.495 | 32.734 | 65.229 | −0.240 |

(5). Establish the NRM graph

Equation (9) yields the net influence matrix in Table S8. We are using the values of ($d + r$) and ($d - r$) from Table S7 as the X and Y values to draw the NRM graph, respectively, as illustrated in Figure S2. The concept and evaluation (CE) aspect is the primary aspect with net influence, while the communication and relationship (CR) aspect is the primary aspect being influenced as shown in Figure S2 and Table S8.

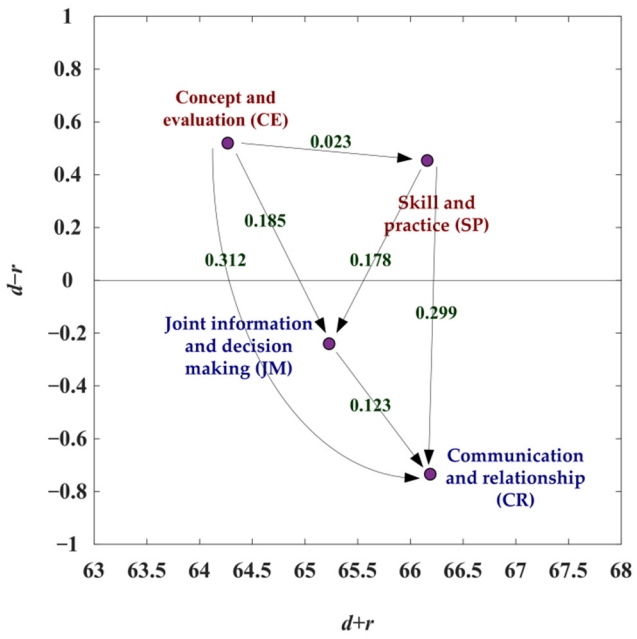



**Figure S2.** The NRM for competency development of SDM tasks.

**Table S8.** The net influence matrix for competence development of SDM tasks.

| Aspects | CE | SP | CR | JM |
|---|---|---|---|---|
| Concept and evaluation (CE) | - | | | |
| Skill and practice (SP) | −0.023 | - | | |
| Communication and relationship (CR) | −0.312 | −0.299 | - | |
| Joint information and decision making (JM) | −0.185 | −0.178 | 0.123 | - |